TI-83

EASY WARM UPS

ALGEBRA TWO

Scatter Plots • Linear Regression • Parametric Equations
• Exponential Functions • Exponential Regression • Compound Interest
• Logarithmic Functions • Logarithmic Regression • Drawing Inverses
• Quadratic Regression • Generating Random Integers
• Mean and Median • Box-and-Whisker Plots
• Histograms • System of Equations • Entering Matrices • Matrix Algebra
• Matrix Operations • Matrix Solutions to a System of Equations
• Graphing Systems of Inequalities • Linear Programming
• Graphing Radical Functions • Complex Numbers • Polynomials Regression
• Graphing Rational Functions • Sequences • Recursion • Graphing Circles
• Graphing Ellipses and Hyperbolas • Combinations and Permutations
• Probability • Trigonometric Ratios

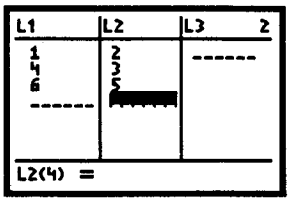
DAVID P. LAWRENCE

To our valued customers: This product is not returnable if shrink wrapping has been opened.
ISBN: 1-58108-016-6

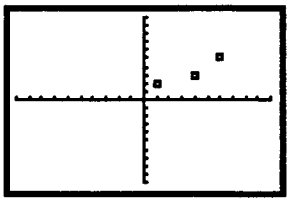
Warm Up 1:
Scatter Plots

Objective: To graph a scatter plot of data points using the TI-83.

1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press ▼ and **CLEAR** to clear additional prompts. Enter the data points in a statistics data set by pressing **STAT 1**. If a data set is present in L_1, press **STAT 4 2nd L1 ENTER** to clear the data set. Repeat for other lists.



2. Re-access the data entry screen by pressing **STAT 1**. Enter the data points (1,2), (4,3), (6,5) by placing the x coordinate in List 1 and the y coordinate in List 2. Do this by pressing **1 ENTER 4 ENTER 6 ENTER ▶ 2 ENTER 3 ENTER 5 ENTER**.



3. View the scatter plot in the standard viewing window by pressing **ZOOM 6 2nd STAT PLOT 1 ENTER ▼ ENTER GRAPH**. Press **2nd STAT PLOT 1 ▶ ENTER** to turn the scatter plot off.

Practice 1:

Graph the scatter plots. Sketch what you see in the space provided.

1. (-1,3), (3,4), (5,-6)

2. (1,5), (2,4), (3,5)

3. (1,-2), (2,-3), (4,-5)

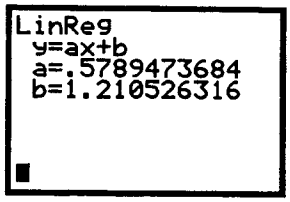
4. (-2,-2), (4,-3), (-7,5)

Copyright © by Pencil Point Press, Inc.

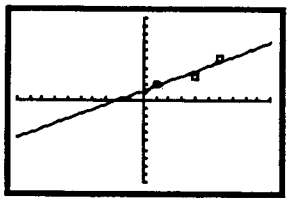
Warm Up 2:
Linear Regression

Objective: Find the best-fitting line for a set of data points using the TI-83.

1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press ▼ and **CLEAR** to clear additional prompts. Enter the data points in a statistics data set, as shown in Warm Up 1. Enter the data points (1,2), (4,3), and (6,5).



2. Calculate the best-fitting line for the data points by pressing **STAT ▶ 4 ENTER**. Notice that the line $y = ax + b$ is displayed. Enter the equation for Y_1 by pressing **Y= CLEAR VARS 5 ▶ ▶ 1** .



3. Turn on the scatter plot as shown in Warm Up 1 and view the points and the best-fitting line by pressing **ZOOM 6** . Remember to turn off the scatterplot.

Practice 2:

Find and graph the best-fitting lines. Sketch what you see in the space provided.

1. (-1,2), (3,4), (5,6)

2. (1,5), (2,4), (3,2)

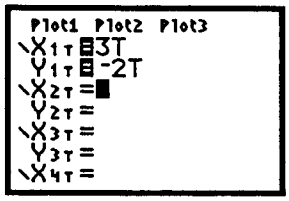
3. (1,-2), (2,1), (4,3)

4. (-2,-2), (-1,1), (2,5)

Copyright © by Pencil Point Press, Inc.

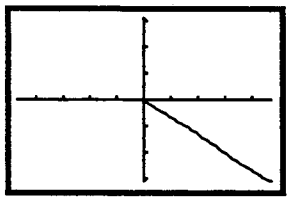
Warm Up 3:
Parametric Equations

Objective: To graph parametric equations using the TI-83.



1. Press **MODE ▼ ▼ ▼ ▶ ENTER** to change the TI-83 to parametric mode. Press **Y=** to view the parametric entry screen. Clear all expressions entered on the screen.

2. To graph the parametric equations x = 3T and y = -2T, enter the expressions for X_{1T} and Y_{1T} by pressing **3 X,T,θ,n ENTER (-) 2 X,T,θ,n ENTER** .



3. Press **ZOOM 4** to view the graph. Press **TRACE** and ▶ to trace the curve. Notice the variable T appears at the bottom of the screen. Press **WINDOW** and notice the T values range from 0 to 6.28. Remember to return the calculator to function mode.

Practice 3:

Graph the parametric equations. Sketch what you see in the space provided.

1. x = 2T and y = T

2. x = -2 – T and y = -1 + 2T

3. x = 1 + 3T and y = 2T

4. x = 2 + T and y = -2 + 2T

Copyright © by Pencil Point Press, Inc.

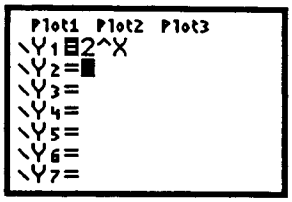
Warm Up 4:
Exponential Functions

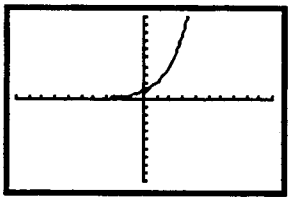
Objective: To graph exponential functions using the TI-83.

1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press ▼ and **CLEAR** to clear additional prompts.

2. To graph the exponential equation $y = 2^x$, enter the equation for Y_1 by moving the blinking cursor to the Y_1 prompt and pressing **2 ^ X,T,θ ,n ENTER** .

3. Set the viewing window to a standard viewing window and view the graph of the equation by pressing **ZOOM 6** (ZStandard).





Practice 4:

Graph each exponential function in the standard viewing window. Sketch what you see in the space below each equation.

1. $y = (2/3)^x$

2. $y = (3/2)^x$

3. $y = -3^x$

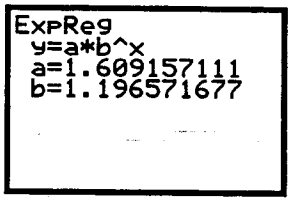
4. $y = -2^{-x}$

Copyright © by Pencil Point Press, Inc.

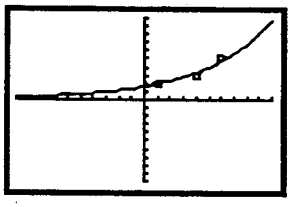
Warm Up 5:
Exponential Regression

Objective: Find the best-fitting exponential for a set of data points using the TI-83.

1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press **▼** and **CLEAR** to clear additional prompts. Enter the data points in a statistics data set as shown in Warm Up 1. Enter the data points (1,2), (4,3), and (6,5).



2. Calculate the best-fitting exponential for the data points by pressing **STAT ▶ 0 ENTER**. Notice that the exponential $y = a \bullet b^x$ is displayed. Enter the equation for Y_1 by pressing **Y= CLEAR VARS 5 ▶ ▶ 1** .



3. Turn on the scatter plot as shown in Warm Up 1 and view the points and the best-fitting exponential by pressing **ZOOM 6** . Remember to turn off the scatterplot.

Practice 5:

Find and graph the best-fitting exponential. Sketch what you see in the space provided.

1. (-1,2), (3,4), (5,6)

2. (1,5), (2,4), (3,2)

3. (1,2), (2,1), (4,3)

4. (-2,2), (-1,1), (2,5)

Copyright © by Pencil Point Press, Inc.

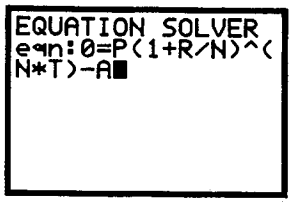
Warm Up 6:
Compound Interest

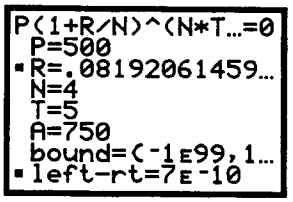
Objective: To find compound interest using the TI-83

1. Press **ON** **2nd** **QUIT** to view the home screen. Press **CLEAR** to clear the screen.

2. To solve a formula on the TI-83 is to use the solver. You will need to subtract the variable on the left hand side of the equals to form an equation equal to zero. The formula for compounding interest is $A = P(1 + r/n)^{nt}$, where A is the amount generated from a principal P, invested for t years, at a rate r, compounded n times a year.

3. Rewrite the formula as $0 = P(1 + r/n)^{nt} - A$. Find the rate needed to grow \$500 into \$750 in five years compounding the interest quarterly by pressing **MATH** **0** (Solver) **▲** **CLEAR** **ALPHA** **P** **(** **1** **+** **ALPHA** **R** **÷** **ALPHA** **N** **)** **^** **(** **ALPHA** **N** **×** **ALPHA** **T** **)** **−** **ALPHA** **A**. Then, press **ENTER** **5** **0** **0** **ENTER** **ENTER** **4** **ENTER** **5** **ENTER** **7** **5** **0** **ENTER** **▲** **▲** **▲** **▲** **ALPHA** **SOLVE** . Notice the percentage rate needed is approximately 8%.





Practice 6:

Use the compound interest formula on your graphing calculator. Round to four decimal places.

1. Find the amount generated by investing \$2000 at 5% for three years compounding the interest monthly. A = _____

2. Find the principal needed to have \$1000 after four years of investment at 7% compounded daily. P = _____

3. How many years will it take for an investment of \$1,500 to grow to \$2,000 at an interest rate of 6% compounded every other month. T = _____

4. Find the rate needed to grow \$100 into \$250 in three years compounding the interest quarterly. R = _____

Copyright © by Pencil Point Press, Inc.

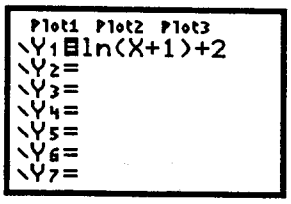
Warm Up 7:
Logarithmic Functions

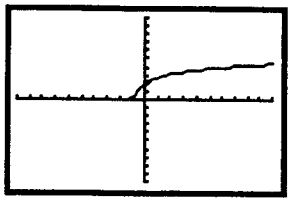
Objective: To graph logarithmic functions using the TI-83.

1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press ▼ and **CLEAR** to clear additional prompts.

2. Logarithmic functions are entered using the **LN** key, and the **LOG** key. With the prompt at Y_1, enter the logarithmic function $f(x) = \ln(x + 1) + 2$ by pressing **LN X,T,θ ,n + 1) + 2** . The parentheses insure that the whole argument has the logarithm applied. View the graph by pressing **ZOOM 6** .

3. Notice the asymptotic behavior of the graph is not displayed very well. The graph appears to stop at the x axis. You can see the asymptotic behavior better by zooming in near the point the graph appears to stop. Zoom in by pressing **ZOOM 2**, moving the cursor near the point and pressing **ENTER** .





Practice 7:

Graph each logarithmic function in the standard viewing window. Sketch what you see in the space below each equation.

1. $y = 2\log(4x)$

2. $y = (\log(x-1))/2 + 1$

3. $y = x + \ln(x + 2)$

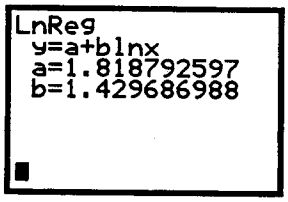
4. $y = (3\ln x)/x$

Copyright © by Pencil Point Press, Inc.

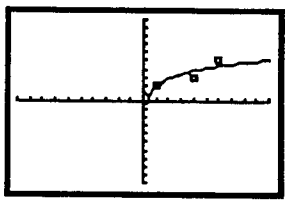
Warm Up 8:
Logarithmic Regression

Objective: Find the best-fitting logarithm for a set of data points using the TI-83.

1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press ▼ and **CLEAR** to clear additional prompts. Enter the data points in a statistics data set as shown in Warm Up 1. Enter the data points (1,2), (4,3), and (6,5).



2. Calculate the best-fitting logarithm for the data points by pressing **STAT** ▶ **9** **ENTER**. Notice that the logarithm y = a + b ln x is displayed. Enter the equation for Y_1 by pressing **Y=** **VARS** **5** ▶ ▶ **1** .



3. Turn on the scatter plot as shown in Warm Up 1 and view the points and the best-fitting logarithm by pressing **ZOOM** **6** . Remember to turn off the scatterplot.

Practice 8:

Find and graph the best-fitting logarithm. Sketch what you see in the space provided.

1. (1,2), (3,4), (5,6)

2. (1,5), (2,4), (3,2)

3. (1,-2), (2,1), (4,3)

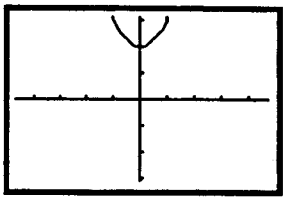
4. (1,-1), (3,1), (5,5)

Copyright © by Pencil Point Press, Inc.

Warm Up 9:
Drawing Inverses

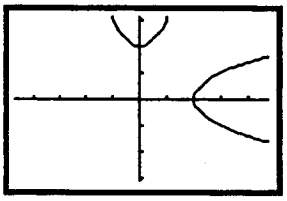
Objective: To draw the inverse of a function using the TI-83.

1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press ▼ and **CLEAR** to clear additional prompts.



2. Graph the function $f(x) = x^2 + 2$ in the Decimal window by pressing **Y= X,T,θ,n x^2 + 2 ENTER ZOOM 4**.

3. Draw the inverse of the function by pressing **2nd DRAW 8 VARS ▶ 1 1 ENTER**.



4. Notice the symmetry across the y = x line.

Practice 9:

Draw the function and its inverse. Sketch what you see in the space provided.

1. $y = x^2 - 2$

2. $y = 6(x - 1)^2$

3. $y = x^2 - 3x - 2$

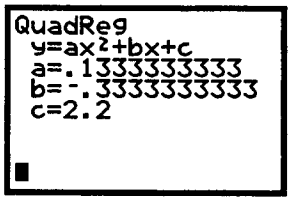
4. $y = -x^2 - 3x + 5$

Copyright © by Pencil Point Press, Inc.

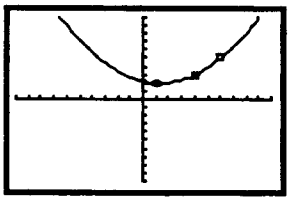
Warm Up 10:
Quadratic Regression

Objective: Find the best-fitting quadratic for a set of data points using the TI-83.

1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press ▼ and **CLEAR** to clear additional prompts. Enter the data points in a statistics data set as shown in Warm Up 1. Enter the data points (1,2), (4,3), and (6,5).



2. Calculate the best-fitting quadratic for the data points by pressing **STAT ▶ 5 ENTER** . Notice that the quadratic $y = ax^2 + bx + c$ is displayed. Enter the equation for Y_1 by pressing **Y= VARS 5 ▶ ▶ 1** .



3. Turn on the scatter plot as shown in Warm Up 1 and view the points and the best-fitting quadratic graph by pressing **ZOOM 6** . Remember to turn off the scatterplot.

Practice 10:

Find and graph the best-fitting quadratic. Sketch what you see in the space provided.

1. (-1,2), (3,4), (5,6)

2. (1,5), (2,4), (3,2)

3. (1,-2), (2,1), (4,3)

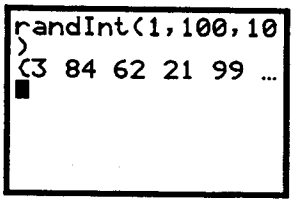
4. (-2,-2), (-1,1), (2,5)

Copyright © by Pencil Point Press, Inc.

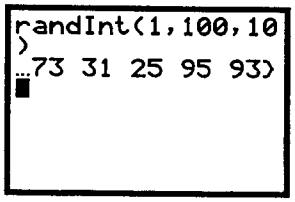
Warm Up 11:
Generating Random Integers

Objective: To generate random numbers with the TI-83.

1. Random integers are numbers that have an equal probability of occurring. Random integers are used for many things. One thing they are used for is selecting a sample from a large group. When using random integers to select samples, you have an equal probability of selecting each object from the large group.



2. Press **2nd QUIT CLEAR** to access and clear the home screen. To generate ten random integers from 1 to 100, press **MATH ▶ ▶ ▶ 5 1 , 1 0 0 , 1 0) ENTER**.



3. The format for the randInt command is the lower bound, followed by the upper bound, followed by the number of integers desired. Press the right arrow to see the remaining integers. Your integers should be different from the ones shown to the right. Truly random samples should be different, but they have the chance to be the same.

Practice 11:

Generate the random integers. List your numbers in the space provided.

1. Generate five random integers from 1 to 50.

2. Generate seven random integers from 1 to 70.

3. Generate four random integers from 1 to 25.

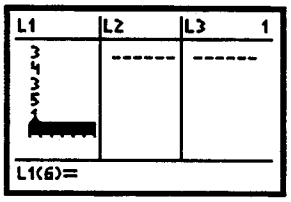
4. Generate ten random integers from 1 to 250.

Copyright © by Pencil Point Press, Inc.

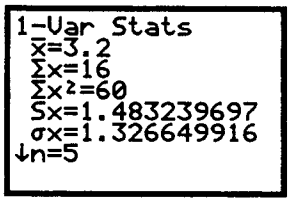
Warm Up 12:
Mean and Median

Objective: To calculate the mean and median of a data set with the TI-83.

1. Enter the data set into the calculator by first pressing **STAT 1** (Edit), and pressing **DEL** repeatedly to delete data from the first list (L_1). If necessary, press ▶ to move to the second list and delete data. Enter the data set {3, 4, 3, 5, 1} into L_1 by pressing **3 ENTER 4 ENTER 3 ENTER 5 ENTER 1 ENTER**.



2. Calculate the mean and median of the data set by pressing **STAT ▶ 1** (1-Var Stats) **ENTER**. Notice the mean (x) is 3.2. Press ▼ several times until you see the median is 3.



Practice 12:

Use your graphing calculator to find the mean and median for each data set.

1. {1, 3, 1, 2, 4, 2, 1, 4}

   mean _____

   median _____

2. {12, 3, 3, 14, 4, 5, 4, 13, 2, 11}

   mean _____

   median _____

3. {8, 5, 8, 4, 9, 5, 3, 4, 3, 3, 2}

   mean _____

   median _____

4. {15, 14, 13, 11, 14, 15, 15}

   mean _____

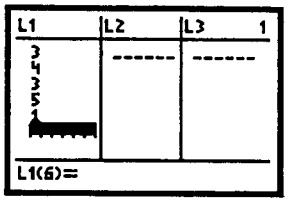
   median _____

Copyright © by Pencil Point Press, Inc.

Warm Up 13:
Box-and-Whisker Plots

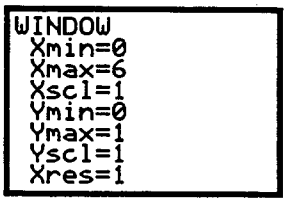
Objective: To draw box-and-whisker plots with the TI-83.

1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press ▼ and **CLEAR** to clear additional prompts.

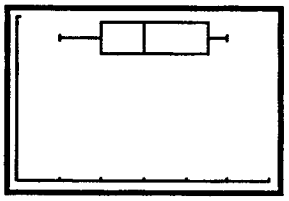


2. Enter the data set into the calculator by first pressing **STAT 1** (Edit), and pressing **DEL** repeatedly to delete data from the first list (L_1). If necessary, press ▶ to move to the second list. Enter the data set {3, 4, 3, 5, 1}into L_1 by pressing **3 ENTER 4 ENTER 3 ENTER 5 ENTER 1 ENTER**.

3. Set the viewing window by pressing **WINDOW 0 ENTER 6 ENTER 1 ENTER 0 ENTER 1 ENTER 1 ENTER**. The Xmin, Xmax and Xscl were set to see all of the box-and-whisker plot. The Ymin, Ymax and Ymin will not change.



4. Set up the box-and-whisker plot by pressing **2nd STATPLOT 1 ENTER ▼ ▶ ▶ ▶ ▶ ENTER ▼ 2nd L1 ENTER ALPHA 1 ENTER**. View the box-and-whisker plot by pressing **GRAPH**. Remember to turn off the statistics plot by pressing **2nd STATPLOT 1 ▶ ENTER CLEAR**.



Practice 13:

Use your graphing calculator to draw box-and-whisker plot. Sketch your results in the space below each set.

1. {1, 3, 1, 2, 4, 2, 1, 4}

2. {2, 3, 3, 4, 4, 5, 4, 3, 2, 1}

3. {1, 2, 3, 4, 4, 3, 3, 2}

4. {5, 4, 3, 1, 4, 5, 5}

Copyright © by Pencil Point Press, Inc.

Warm Up 14: Histograms

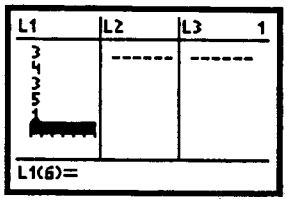
Objective: To draw histograms with the TI-83

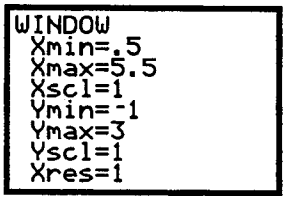
1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press ▼ and **CLEAR** to clear additional prompts.

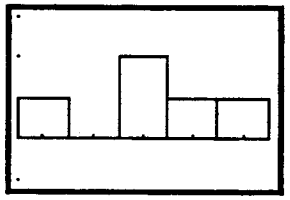
2. Enter the data set into the calculator by first pressing **STAT 1** (Edit), and pressing **DEL** repeatedly to delete data from the first list (L1). If necessary, press ▶ to move to the second list. Enter the data set {3, 4, 3, 5, 1} into L1 by pressing **3 ENTER 4 ENTER 3 ENTER 5 ENTER 1 ENTER**.

3. Set the viewing window by pressing **WINDOW . 5 ENTER 5 . 5 ENTER 1 ENTER (-) 1 ENTER 3 ENTER 1 ENTER**. The Xmin, Xmax and Xscl were set to create bars of length one over each of the numbers 1 through 5. The Ymin, Ymax and Yscl were set to see the entire histogram.

4. Set up the histogram by pressing **2nd STATPLOT 1 ENTER ▼ ▶ ▶ ENTER ▼ 2nd L1 ENTER ALPHA 1 ENTER**. View the histogram by pressing **GRAPH** . Remember to turn off the statistics plot by pressing **2nd STATPLOT 1 ▶ ENTER CLEAR**.







Practice 14:

Use your graphing calculator to draw histograms. Sketch your results in the space below each set.

1. {1, 3, 1, 2, 4, 2, 1, 4}

2. {2, 3, 3, 4, 4, 5, 4, 3, 2, 1}

3. {1, 2, 3, 4, 4, 3, 3, 2}

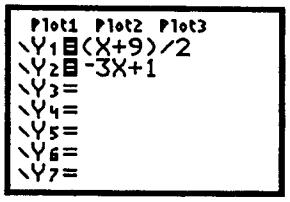
4. {5, 4, 3, 1, 4, 5, 5}

Copyright © by Pencil Point Press, Inc.

Warm Up 15:
Systems of Equations

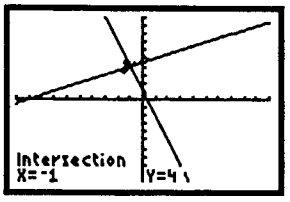
Objective: To solve a system of equations with the TI-83.

1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press ▼ and **CLEAR** to clear additional prompts.



2. To solve a system of two equations of two variables, you must first solve the equations for y explicitly in terms of x, and then enter the equations into Y_1 and Y_2. For example, to solve the system $-x + 2y = 9$ and $3x + y = 1$, you would rewrite the equations as $y = (x + 9)/2$ and $y = -3x + 1$.

3. Enter the first equation for Y_1 and the second equation for Y_2. Press **ZOOM 6** to view the graphs of the system of equations in the Standard viewing window.



4. The intersection of the graphs represents the solution to the system of equations. Press **2nd CALC 5** to access the intersection calculation feature. Set the first curve by tracing near the intersection on the curve and pressing **ENTER** . Set the second curve by tracing near the intersection on the curve and pressing **ENTER ENTER** . If more than two equations are present, make sure your tracer is on the equations of interest. An accurate approximate for the intersection will appear at the bottom of the screen. The solution to the system of equations is (x, y) = (-1, 4).

Practice 15:

Solve the system of equations. Sketch what you see in the space provided.

1. $x - y = 4$
   $-2x + 3y = 6$

2. $-x + 2y = 8$
   $3x - y = 3$

3. $x + y = 3$
   $2x - 3y = 6$

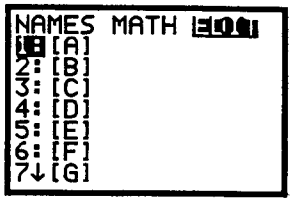
4. $x - 2y = 2$
   $4x + y = 4$

Copyright © by Pencil Point Press, Inc.

Warm Up 16:
Entering Matrices

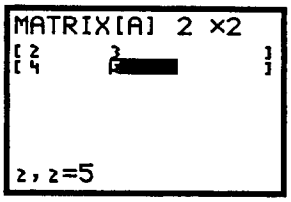
Objective: To enter a matrix into the TI-83.

1. To enter the 2 x 2 matrix A = $\begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ into the TI-83, press **MATRX** ▶ ▶ (EDIT) and press **1** to select matrix A. You can enter and save up to ten matrices.



2. Enter the dimensions of the matrix by pressing **2 ENTER 2 ENTER**.

3. Enter each row of the matrix by pressing **2 ENTER 3 ENTER 4 ENTER 5 ENTER**.



4. To enter another 2 x 2 matrix B = $\begin{bmatrix} 1 & 6 \\ 7 & 8 \end{bmatrix}$ into the TI-83, press **MATRX** ▶ ▶ (EDIT) and press **2** to select matrix B. Enter the dimensions and then enter the rows.

5. Press **2nd QUIT CLEAR** to return to and clear the home screen.

Practice 16:

Enter the matrix.

1. C = $\begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix}$

2. D = $\begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix}$

3. E = $\begin{bmatrix} -1 & 5 \\ 7 & -3 \end{bmatrix}$

4. F = $\begin{bmatrix} 4 & -6 \\ -2 & 7 \end{bmatrix}$

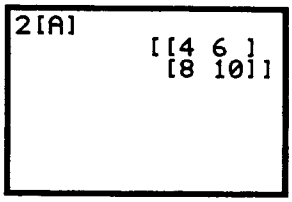
5. G = $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

Copyright © by Pencil Point Press, Inc.

Warm Up 17:
Matrix Algebra

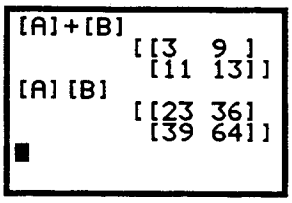
Objective: To multiply a matrix by a scalar, and add, subtract, and multiply matrices.

1. To multiply the matrix A (from Warm Up 16) by the scalar 2, return to and clear the home screen by pressing **2nd QUIT CLEAR**, then press **2 MATRX 1** ([A]) **ENTER**.



2. To add matrix A to matrix B (from Warm Up 16), press **CLEAR MATRX 1** ([A]) **+ MATRX 2** ([B]) **ENTER**. Subtraction is performed in the same manner.

3. To multiply matrix A to matrix B (from Warm Up 16), press **CLEAR MATRX 1** ([A]) **MATRX 2** ([B]) **ENTER**.



Practice 17:

Find the following using [A] and [B] from Warm Up 16.

1. [A] – [B]

2. -3[B]

3. [B]•[A]

4. [B] + [A]

5. [B] – [A]

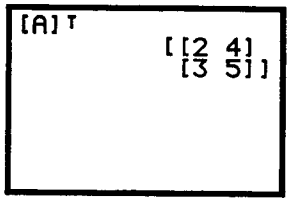
6. 3[A] – 2[B]

Copyright © by Pencil Point Press, Inc.

Warm Up 18:
Matrix Operations

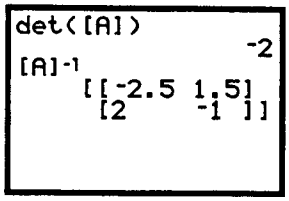
Objective: To find the transpose, determinant and inverse of a matrix with the TI-83.

1. To find the transpose of matrix A (from Warm Up 16), start with a blank screen and press **MATRX** **1** ([A]) **MATRX** ▶ **2** (^{T}) **ENTER**.



2. To find the determinant of matrix A, press **CLEAR** **MATRX** ▶ **1** (det) **MATRX** **1** ([A])) **ENTER**.

3. To find the inverse of matrix A, press **MATRX** **1** ([A]) x^{-1} **ENTER**.



Practice 18:

Find the following using [A] and [B] from Warm Up 16.

1. $[B]^T$

2. det [B]

3. $[B]^{-1}$

4. $[C]^T$

5. det [C]

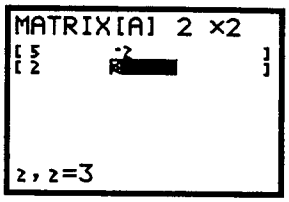
6. $[C]^{-1}$

Copyright © by Pencil Point Press, Inc.

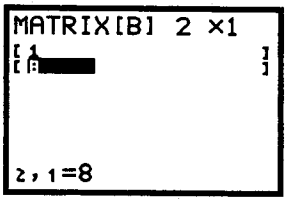
Warm Up 19:
Matrix Solution to a System of Equations

Objective: To use matrices to solve a system of equations with the TI-83.

1. To solve the system of equations, $5x - 2y = 1$ and $2x + 3y = 8$, you will first enter the coefficients within the matrix A by pressing **MATRX ▶ ▶ 1** ([A]) **ENTER ENTER 5 ENTER (-) 2 ENTER 2 ENTER 3 ENTER**.



2. Enter the constants within the matrix B by pressing **MATRX ▶ ▶ 2** ([B]) **ENTER 1 ENTER 1 ENTER 8 ENTER**.



3. Systems of equations are solved by manipulating the matrix equation $AX = B$. Multiply both sides by A^{-1}

$$A^{-1}AX = A^{-1}B$$

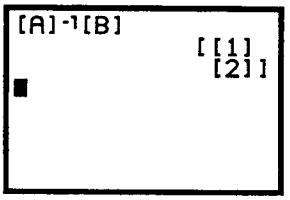
Substitute I (Identity Matrix) for $A^{-1}A$.

$$IX = A^{-1}B$$

Observe that $IX = X$

$$X = A^{-1}B$$

Therefore, the solution matrix X can be found by multiplying $A^{-1}B$.



4. Multiply $A^{-1}B$ by pressing **2nd QUIT CLEAR MATRX 1** ([A]) x^{-1} **MATRX 2** ([B]) **ENTER**. The solution (x,y) = (1,2) will appear.

Practice 19:

Solve the system of equations using a matrix.

1. $x - y = 4$
$-2x + 3y = 6$

2. $-x - 2y = 8$
$3x - y = 3$

3. $4x + 8y = 42$
$x + .5y = 6$

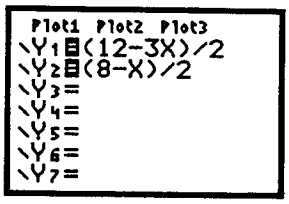
4. $3x - 8y = -10$
$15x + 40y = 50$

Copyright © by Pencil Point Press, Inc.

Warm Up 20:
Graphing Systems of Inequalities

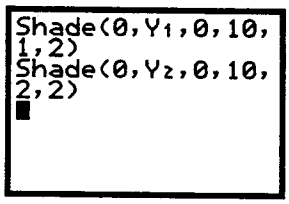
Objective: To graph a system of inequalities using the TI-83.

1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press ▼ and **CLEAR** to clear additional prompts.

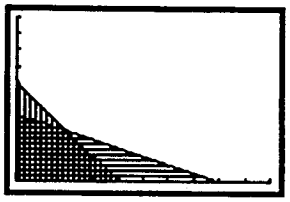


2. To find the solution set for a system of two inequalities, you will first graph the equalities as Y_1 and Y_2. To do this, you must solve for y explicitly in terms of x. For example $3x + 2y \leq 12$ would be written as $y \leq (12 - 3x)/2$ and $x + 2y \leq 8$ as $y \leq (8 - x)/2$. Other conditions may exist such as $x \geq 0$ and $y \geq 0$, and these can be addressed with the viewing window.

3. Enter the equations for Y_1 and Y_2. Address the last two inequalities by pressing **WINDOW** and setting the viewing window to Xmin = 0, Xmax = 10, Xscl = 1, Ymin = 0, Ymax = 10, and Yscl = 1. Press **GRAPH** to view the equations.



4. Shade below the first inequality's graph (Y_1) by pressing **2nd DRAW 7 0 , VARS ▶ 1 1 , 0 , 1 0 , 1 , 2) ENTER** . Shade below the second inequality's graph (Y_2) by pressing **2nd DRAW 7 0 , VARS ▶ 1 2 , 0 , 1 0 , 2 , 2) ENTER** . The items separated by commas in the shade command are (in order) the lower bound, upper bound, left bound, right bound, pattern, and pattern resolution. Pattern 1 is a vertical line and pattern 2 is a horizontal line. A resolution of 2 tells the calculator to shade every other line. The region with the checkerboard design is the solution set for the system of inequalities.



Practice 20:

Graph the system of inequality. Sketch what you see in the space provided.

1. $2x + 3y \geq 10$

   $2x + y \leq 8$

   $x \geq 0 \quad y \geq 0$

2. $x + 3y \leq 9$

   $-2x + y \geq -4$

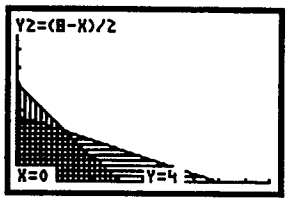
   $x \geq 0 \quad y \geq 0$

Copyright © by Pencil Point Press, Inc.

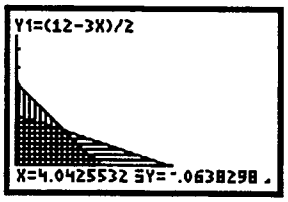
Warm Up 21: Linear Programming

Objective: To maximize or minimize a function subject to a set of constraints with the TI-83.

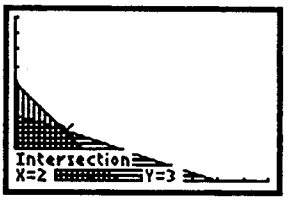
1. To maximize or minimize the function P = 2x + 3y, subject to the constraints (system of inequalities) provided in Warm Up 20, you will need to find the corner points for the solution set found in Warm Up 20. In linear programming, the corner points will maximize and minimize the system. One of your corner points is the origin (0, 0). You will use the trace and calculate features to find the other corner points.



2. Approximate the corner points on the x and y axes using the trace feature. Remember to press ◀ or ▶ to move the cursor to the other graph.



3. The corner points on the x and y axes appear to be (0, 4) and (4, 0). Find the corner point formed by the intersection of the two graphs using the calculate feature. Do this by pressing **2nd CALC 5** (intersect), setting the first line by pressing **ENTER** , setting the second line by pressing **ENTER** , and approximating the intersection by pressing **ENTER** .



4. The fourth and final corner point is (2, 3). Now evaluate the function P at the four points to see which point minimizes and which point maximizes the function.

   P(0, 0) = 2(0) + 3(0) = 0
   P(4, 0) = 2(4) + 3(0) = 8
   P(0, 4) = 2(0) + 3(4) = 12
   P(2, 3) = 2(2) + 3(3) = 13

   The point (0,0) minimizes the function, whereas the point (2,3) maximizes.

Practice 21:

Maximize or minimize P = 3x – 2y subject to the constraints.

1. $2x + 3y \geq 10$
   $2x + y \leq 8$
   $x \geq 0$
   $y \geq 0$

2. $x + 3y \leq 9$
   $-2x + y \geq -4$
   $x \geq 0$
   $y \geq 0$

3. $2x + y \leq 5$
   $x - y \leq 1$
   $x \geq 0$
   $y \geq 0$

4. $x + y \geq 2$
   $x + y \leq 4$
   $x \geq 0$
   $y \geq 0$

Copyright © by Pencil Point Press, Inc.

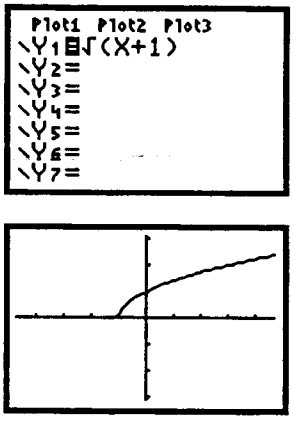
Warm Up 22:
Graphing Radical Functions

Objective: To graph radical functions using the TI-83.

1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press ▼ and **CLEAR** to clear additional prompts.

2. To graph a radical function, for example, the equation $y = \sqrt{(x + 1)}$, enter the equation for Y_1 by moving the blinking cursor to the Y_1 prompt and pressing **2nd** $\sqrt{}$ **X,T,θ ,n + 1) ENTER**. Notice the expression under the radical is enclosed in parentheses.

3. Set the viewing window to the decimal viewing window and view the graph of the equation by pressing **ZOOM 4** (ZDecimal).



Practice 22:

Graph each radical equation in the decimal viewing window. Sketch what you see in the space below each equation.

1. $y = \sqrt{(x - 2)}$

2. $y = \sqrt{(x^2 - 1)}$

3. $y = \sqrt{(2x + 1)}$

4. $y = -\sqrt{(4x - 1)}$

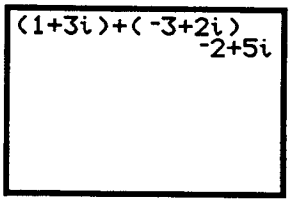
Copyright © by Pencil Point Press, Inc.

Warm Up 23:
Complex Numbers

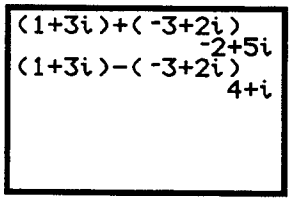
Objective: To add, subtract, multiply and divide complex numbers with the TI-83.

1. Press **2nd QUIT** and **CLEAR** to access and clear the home screen.

2. To add two complex numbers 1 + 3i and -3 + 2i, press **(1 + 3 2nd i) + ((-) 3 + 2 2nd i) ENTER**.



3. To subtract the two complex numbers, press **2nd ENTRY** to recall the previous expression. Edit the expression by pressing ◀ eight times to move the cursor over the addition sign. Change it to a subtraction by pressing **–** and then press **ENTER** to perform the subtraction.



4. Repeat step 3 for multiplication and division.

Practice 23:

Add, subtract, multiply and divide the complex numbers.

1. 1 + 3i and 2 + 4i

2. -2 + 5i and 3 + i

3. 1 – 3i and 2 + 5i

4. 5 + 2i and -1 + 3i

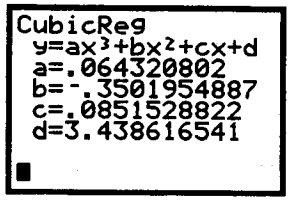
5. 4 + 3i and 2 – 2i

Copyright © by Pencil Point Press, Inc.

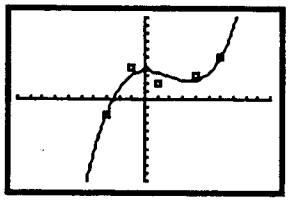
Warm Up 24:
Polynomial Regression

Objective: Find the best-fitting cubic or quartic for a set of data points using the TI-83.

1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press ▼ and **CLEAR** to clear additional prompts. Enter the data points in a statistics data set as shown in Warm Up 1. Enter the data points (-3, -2), (-1, 4), (1,2), (4,3), and (6,5). You need at least four points for a cubic regression and five points for a quartic regression.



2. Calculate the best-fitting cubic for the data points by pressing **STAT ▶ 6 ENTER**. Notice that the cubic $y = ax^3 + bx^2 + cx + d$ is displayed. Enter the equation for Y_1 by pressing **Y= VARS 5 ▶ ▶ 1** .



3. Turn on the scatter plot as shown in Warm Up 1 and view the points and the best-fitting cubic by pressing **ZOOM 6** . Remember to turn off the scatterplot.

4. The quartic regression is done in similar manner.

Practice 24:

Find and graph the best-fitting polynomial. Sketch what you see in the space provided.

1. (-1,2), (1,1), (2,2), (3,4), (5,6)
   cubic

2. (-1, -1), (1,5), (2,4), (3,2), (4,4)
   quartic

3. (-2, 1), (-1, 2), (1,-2), (2,1), (4,3)
   cubic

4. (-2,-2), (-1,1), (1,3), (2,4), (3,6)
   quartic

Copyright © by Pencil Point Press, Inc.

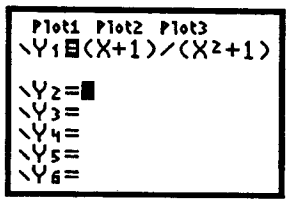
Warm Up 25:
Graphing Rational Functions

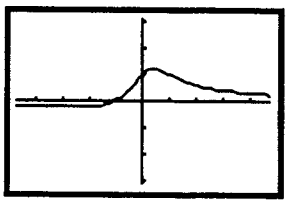
Objective: To graph rational functions using the TI-83.

1. Press **Y=** and **CLEAR** to clear the Y_1 prompt. Press ▼ and **CLEAR** to clear additional prompts.

2. To graph a rational function, for example, the equation $y = (x + 1)/(x^2 + 1)$, enter the equation for Y_1 by moving the blinking cursor to the Y_1 prompt and pressing **(X,T,θ ,n + 1) ÷ (X,T,θ ,n x² + 1) ENTER**. Notice the numerator and denominator are enclosed in parentheses.

3. Set the viewing window to the decimal viewing window and view the graph of the equation by pressing **ZOOM 4** (ZDecimal).





Practice 25:

Graph each rational equation in the decimal viewing window. Sketch what you see in the space below each equation.

1. $y = 3/(x - 2)$

2. $y = x/(x^2 - 1)$

3. $y = 4/(x^2 + 2x + 1)$

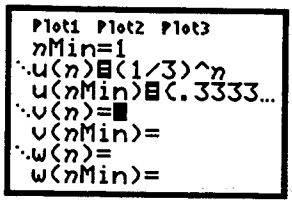
4. $y = (x^2 + 1)/(x^3 - 1)$

Copyright © by Pencil Point Press, Inc.

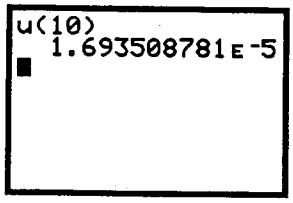
Warm Up 26: Sequences

Objective: To generate sequences with the TI-83.

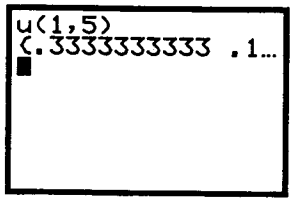
1. Press **MODE** ▼ ▼ ▼ ▶ ▶ ▶ (Seq) **ENTER** to change the TI-83 to sequence mode.



2. Press **Y=** to view the sequence entry screen. Clear old expressions. Enter the sequence to be generated for u(n). For example, enter the generator (1/3)^n for u(n) by pressing **(1 ÷ 3) ^ X,T,θ,n ENTER** . Enter u(nMin) = 1/3 by pressing **1 ÷ 3 ENTER** . Notice that the 1/3 is changed to a { .33 } upon entry.



3. Press **2nd QUIT** to exit the equation screen and return to the HOME screen. To compute the 10th term in the sequence u(n), press **2nd u** (above the 7 key) **(1 0) ENTER** .



4. To generate the first five terms of the sequence, press **2nd u (1** (nstart) **, 5** (nstop) **) ENTER** . Press ▶ to view the additional terms in the sequence. Remember to return the calculator to function mode.

Practice 26:

Find the terms of the sequence.

1. The 15th term of the sequence (1/5)^n

2. The first eight terms of the sequence (1/5)^n

3. The 20th term of the sequence (1/4)^n

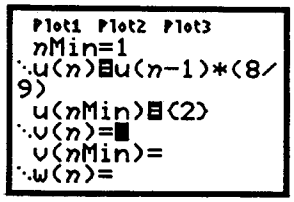
4. The first ten terms of the sequence (1/4)^n

Copyright © by Pencil Point Press, Inc.

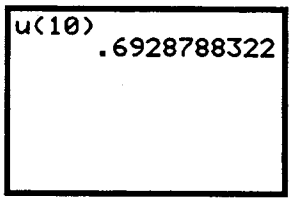
Warm Up 27: Recursion

Objective: To generate recursive sequences with the TI-83.

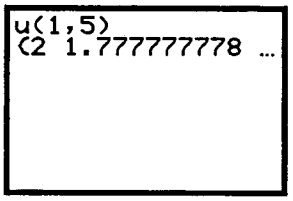
1. Press **MODE** ▼ ▼ ▼ ▶ ▶ ▶ (Seq) **ENTER** to change the TI-83 to sequence mode.



2. Press **Y=** to view the sequence entry screen. Clear old expressions. Enter the recursive sequence to be generated for u(n). Recursively generated sequences can be entered using the variable u(n-1) instead of n. For example, enter the generator u(n-1)•(8/9) for u(n) by pressing **2nd u** (**X,T,θ,n** **–** **1**) × (**8** ÷ **9**) **ENTER**. Enter u(nMin) = 2 by pressing **2** **ENTER**.



3. Press **2nd** **QUIT** to exit the equation screen and return to the HOME screen. To compute the 10th term in the recursive sequence u(n), press **2nd** **u** (above the 7 key) (**1** **0**) **ENTER**.



4. To generate the first five terms of the recursive sequence, press **2nd** **u** (**1** (nstart) , **5** (nstop)) **ENTER**.
   Press ▶ to view the additional terms in the sequence.
   Remember to return the calculator to function mode.

Practice 27:

Find the terms of the recursive sequence.

1. The 15th term of the sequence u(n–1)•(4/5) starting with 5.

2. The first eight terms of the sequence u(n–1)•(4/5) starting with 5.

3. The 20th term of the sequence u(n–1)•(9/10) starting with 3.

4. The first ten terms of the sequence u(n–1)•(9/10) starting with 3.

Copyright © by Pencil Point Press, Inc.

Warm Up 28:
Graphing Circles

Objective: To graph circles with the TI-83.

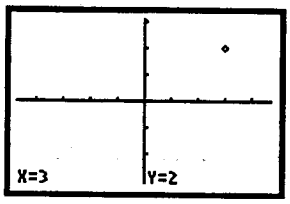
1. Press **Y=** and clear old expressions.

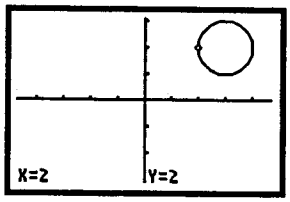
2. Press **ZOOM** **4** to view a clear viewing window.

3. To graph the circle in the form $(x - h)^2 + (y - k)^2 = r^2$, you will use the circle drawing feature of the TI-83. For example, in the circle $(x - 3)^2 + (y - 2)^2 = 1^2$, h = 3, k = 2 and r = 1. Press **2nd** **DRAW** **9**, move the cursor right to an 'h' of x = 3 by pressing ▶, move the cursor up to a 'k' of y = 2 by pressing ▲. Press **ENTER** to set the center point.

4. Move the cursor the length of the radius in one direction away from the center. In your example, you would move the cursor 1 unit away from the center and press **ENTER**. The circle will be drawn for you with the cursor appearing at the point on the circle to which you moved.

5. If the circle will not completely appear in the viewing window, then zoom out on the decimal window to a larger window. Other viewing windows may distort the circle.





Practice 28:

Graph the circle. Sketch what you see in the space below each equation.

1. $(x - 1)^2 + (y + 2)^2 = 2^2$

2. $(x - 2)^2 + (y - 1)^2 = 3^2$

3. $(x + 1)^2 + (y + 1)^2 = 1^2$

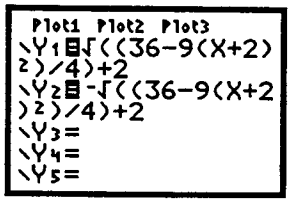
4. $(x + 3)^2 + (y - 1)^2 = 2^2$

Copyright © by Pencil Point Press, Inc.

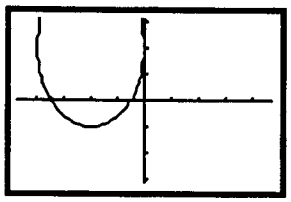
Warm Up 29:
Graphing Ellipses and Hyperbolas

Objective: To graph ellipses and hyperbolas with the TI-83.

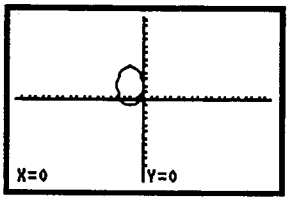
1. Press **Y=** and clear old expressions.



2. To graph an ellipse or hyperbola, you must first solve for y explicitly in terms of x. This will result in two equations. For example, the ellipse
   $9(x + 2)^2 + 4(y - 2)^2 = 36$ would be rewritten as...
   $4(y - 2)^2 = 36 - 9(x + 2)^2$
   $(y - 2)^2 = (36 - 9(x + 2)^2)/4$
   $y - 2 = \pm\sqrt{((36 - 9(x + 2)^2)/4)}$
   $y = \pm\sqrt{((36 - 9(x + 2)^2)/4)} + 2$



3. Enter the positive of the equation for Y_1 and the negative for Y_2. With the cursor at the Y_1 prompt, press **2nd** $\sqrt{}$ **(3 6 − 9 (X,T,θ,n + 2) x^2) ÷ 4) + 2 ENTER (-) 2nd** $\sqrt{}$ **(3 6 − 9 (X,T,θ,n + 2) x^2) ÷ 4) + 2**.



4. Press **ZOOM 4** to view the ellipse.

5. Press **ZOOM 3 ENTER** to view more of the ellipse. Hyperbolas are graphed in a similar manner.

Practice 29:

Graph the ellipse or hyperbola in the decimal viewing window. Sketch what you see in the space below each equation.

1. $2(x + 1)^2 + 3(y - 2)^2 = 6$

2. $4(x - 2)^2 + 3(y + 1)^2 = 12$

3. $(x - 1)^2 - (y - 2)^2 = 9$

4. $(x + 1)^2 - (y - 3)^2 = 4$

Copyright © by Pencil Point Press, Inc.

Warm Up 30:
Combinations and Permutations

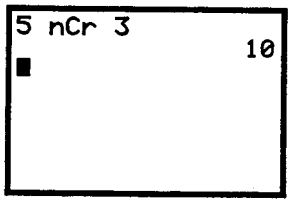
Objective: To find combinations and permutations with the TI-83

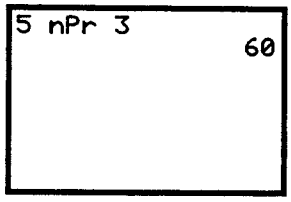
1. Press **ON** **2nd** **QUIT** to view the home screen. Press **CLEAR** to clear the screen.

2. Counting involves combinations and permutations. For example, combinations are the number of possible sets of 3 we might get from a set of 5, where order does not matter (Committee of three). Permutations are the number of possible sets of 3 we might get from a set of 5, where order matters (President, Vice-President, Secretary).

3. Find the number of combinations of 3 from a set of 5 by pressing **5** **MATH** ▶ ▶ ▶ **3** (nCr) **3** **ENTER**. Notice the number of combinations is 10.

4. Find the number of permutations of 3 from a set of 5 by pressing **5** **MATH** ▶ ▶ ▶ **2** (nPr) **3** **ENTER**. Notice the number of permutations is 60.





Practice 30:

Calculate the combinations and permutations.

1. The number of combinations of 5 from a set of 8.

   _____

2. The number of permutations of 5 from a set of 8.

   _____

3. The number of combinations of 4 from a set of 7.

   _____

4. The number of permutations of 4 from a set of 7.

   _____

5. The number of combinations of 2 from a set of 6.

   _____

6. The number of permutations of 2 from a set of 6.

   _____

7. The number of combinations of 3 from a set of 9.

   _____

8. The number of permutations of 3 from a set of 9.

   _____

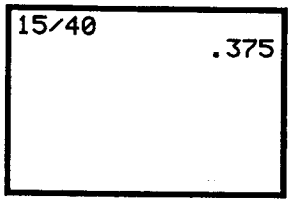
Copyright © by Pencil Point Press, Inc.

Warm Up 31: Probability

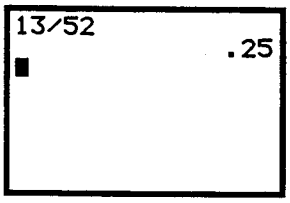
Objective: To calculate probability using the TI-83.

1. Press **ON** **2nd** **QUIT** to view the home screen. Press **CLEAR** to clear the screen.

2. Calculate the probability of an event using the graphing calculator. The method for finding the probability of an event is to divide the number of possibilities in the event by the total number of possibilities. For example, 15 girls are in a class of 40 students, find the probability of a answering a question by pressing **1** **5** **÷** **4** **0** **ENTER** . The probability of a girl answering a question is .375.



3. Find the probability of drawing a heart from a standard set of shuffled cards. There are 13 heart cards in a standard set of cards. There are 52 cards in the whole deck. Find the probability of drawing a heart by pressing **1** **3** **÷** **5** **2** **ENTER** . The probability of drawing a heart from a standard set of shuffled cards is .25.



Practice 31:

Calculate the probabilities.

1. Drawing a Jack of Clubs from a standard set of shuffled cards.

   _____

2. Picking a perfect square from the integers 1 through 30.

   _____

3. Drawing a number less than 5 from a deck of shuffled cards (no Aces).

   _____

4. Getting an 8 when rolling a single die.

   _____

5. Picking a multiple of 7 from the integers 1 through 30.

   _____

6. Getting a 5 or 2 when rolling a single die.

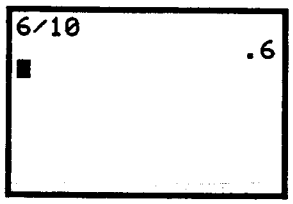
   _____

Copyright © by Pencil Point Press, Inc.

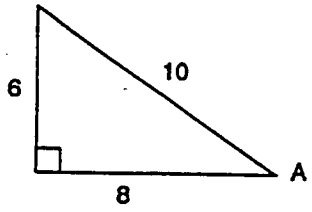
Warm Up 32: Trigonometric Ratios

Objective: To find the trigonometric ratios using the TI-83

1. Press **ON** **2nd** **QUIT** to view the home screen. Press **CLEAR** to clear the screen.



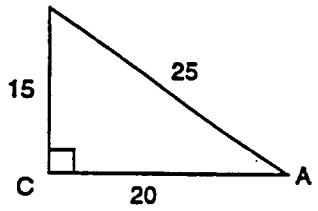
2. The sine of angle A is the measure of the side opposite angle A divided by the measure of the hypotenuse. The cosine of angle A is the measure of the side adjacent angle A divided by the measure of the hypotenuse. The tangent of angle A is the measure of the side opposite angle A divided by the measure of the side adjacent angle A. You can easily find a trigonometric ratio on the graphing calculator. To find the sine ratio for angle A in the triangle shown below, press **6** ÷ **1** **0** **ENTER**. Notice the sine of A is .6.



Practice 32:

Use your graphing calculator to find the trigonometric ratios of the triangle.

1.



sin A = _____

cos A = _____

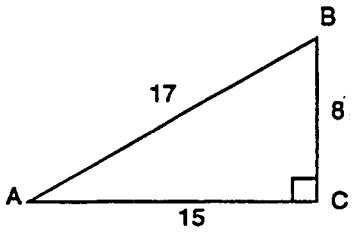
tan A = _____

sin B = _____

cos B = _____

tan B = _____

2.



sin A = _____

cos A = _____

tan A = _____

sin B = _____

cos B = _____

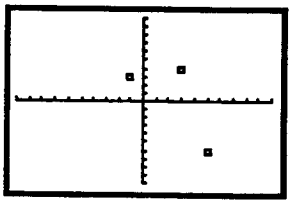
tan B = _____

Copyright © by Pencil Point Press, Inc.

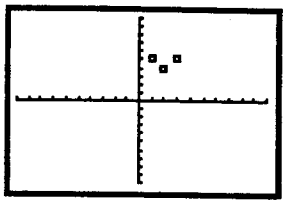
Answer Key

Practice 1:

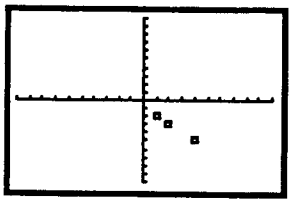
1.



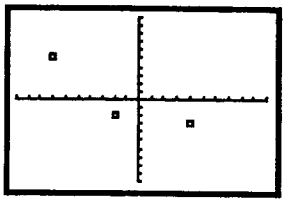
2.



3.

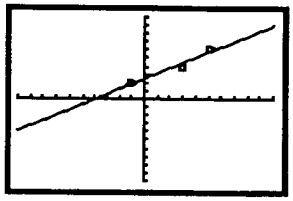


4.

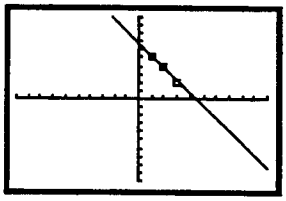


Practice 2:

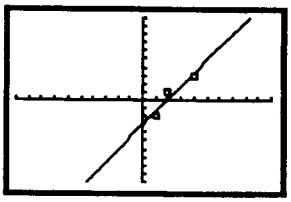
1.



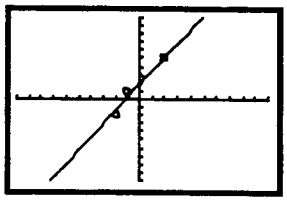
2.



3.

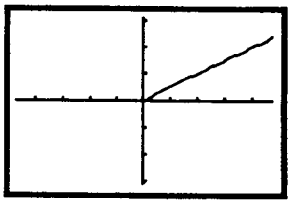


4.

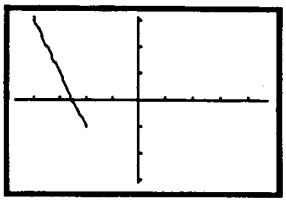


Practice 3:

1.

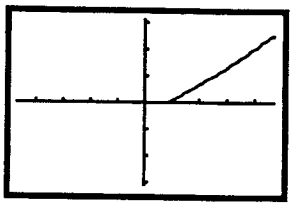


2.

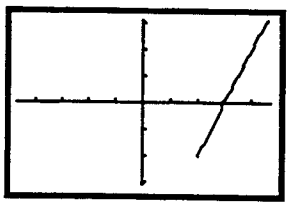


Copyright © by Pencil Point Press, Inc.

3.

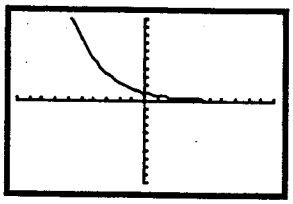


4.

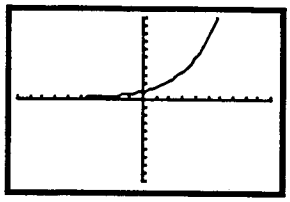


Practice 4:

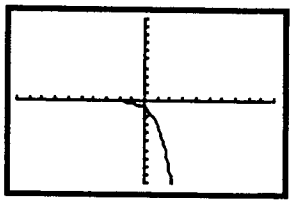
1.



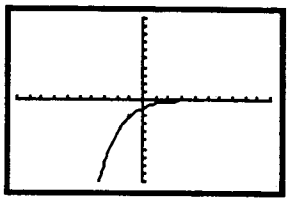
2.



3.

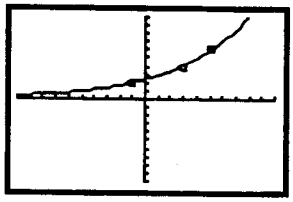


4.

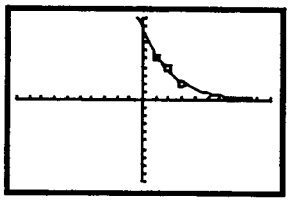


Practice 5:

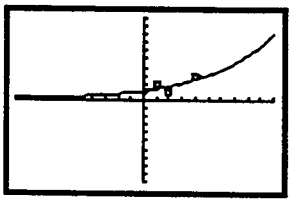
1.



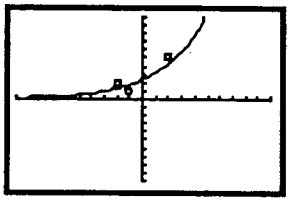
2.



3.



4.



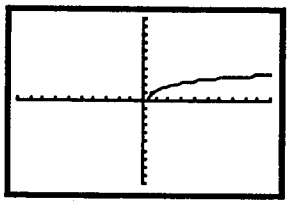
Practice 6:

1. $2322.94 **2.** $755.80 **3.** 4.81 **4.** 32%

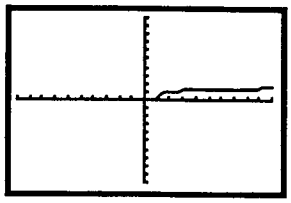
Copyright © by Pencil Point Press, Inc.

Practice 7:

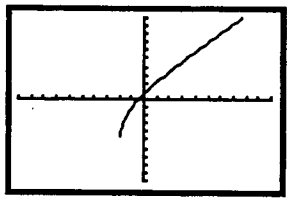
1.



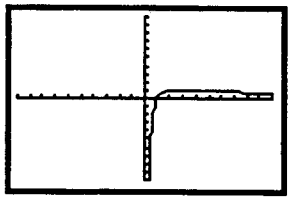
2.



3.

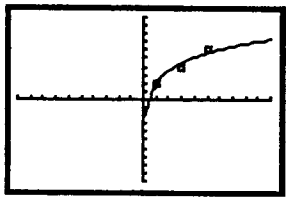


4.

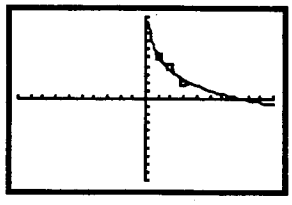


Practice 8:

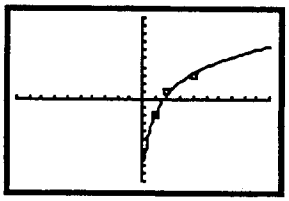
1.



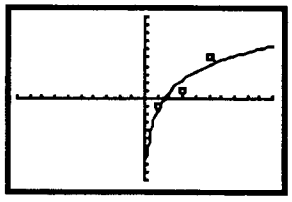
2.



3.

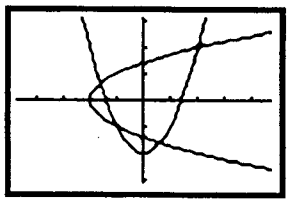


4.

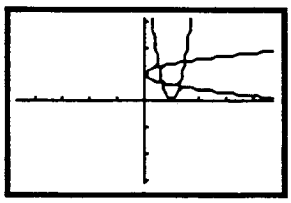


Practice 9:

1.

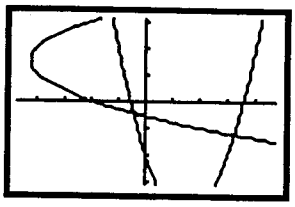


2.

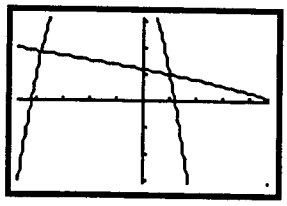


Copyright © by Pencil Point Press, Inc.

3.

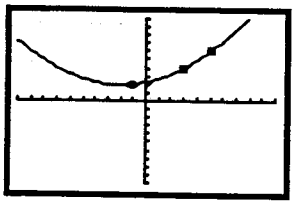


4.

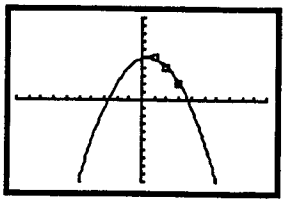


Practice 10:

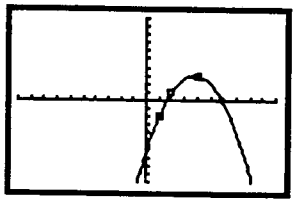
1.



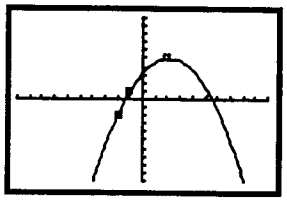
2.



3.



4.



Practice 11:

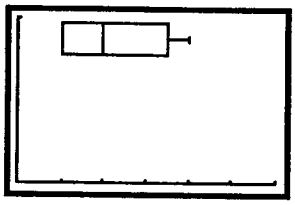
1. 6,13,43,19,30
2. 43,6,2,1,49,50,62
3. 10,3,12,25
4. 175,137,160,233,169,200,139,85,55,156

Practice 12:

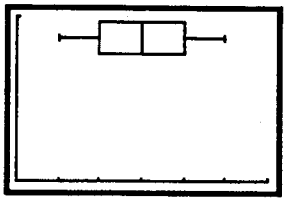
1. 2.25, 2
2. 7.1, 4.5
3. 4.91, 4
4. 13.86, 14

Practice 13:

1.

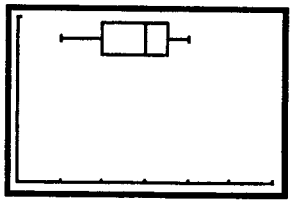


2.

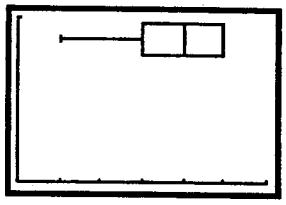


Copyright © by Pencil Point Press, Inc.

3.

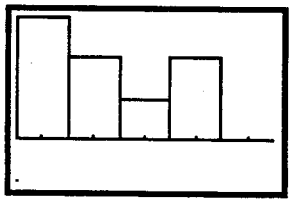


4.

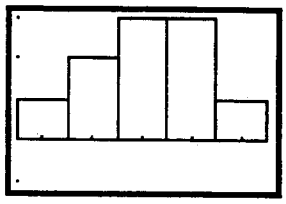


Practice 14:

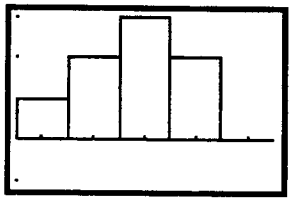
1.



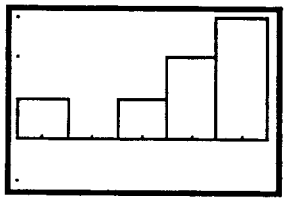
2.



3.

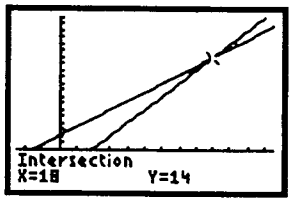


4.

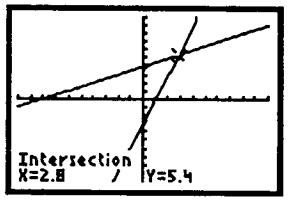


Practice 15:

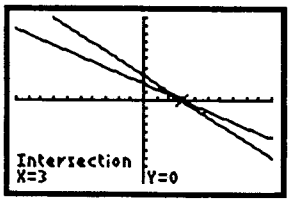
1.



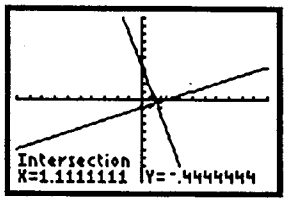
2.



3.



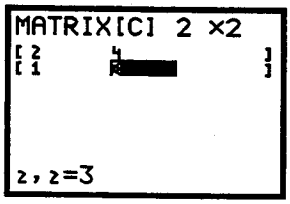
4.



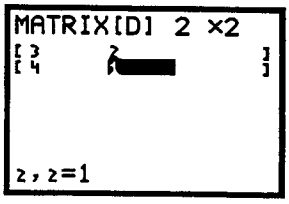
Copyright © by Pencil Point Press, Inc.

Practice 16:

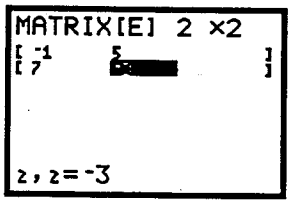
1.



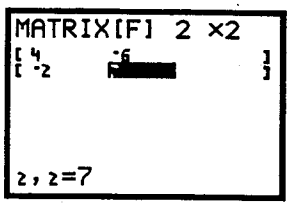
2.



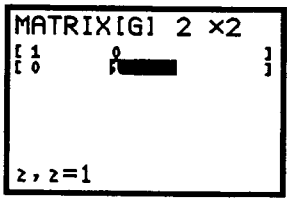
3.



4.

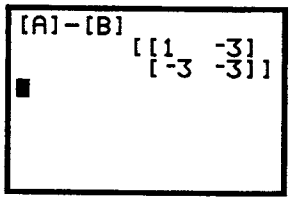


5.

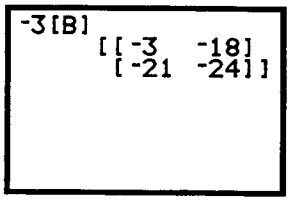


Practice 17:

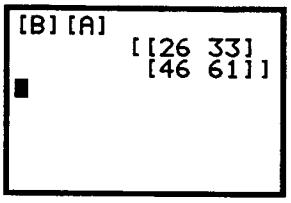
1.



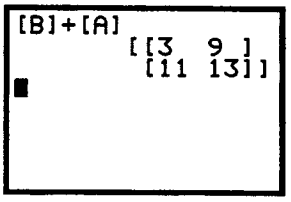
2.



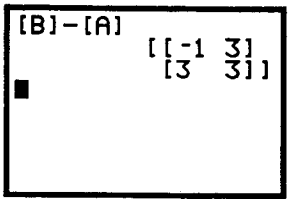
3.



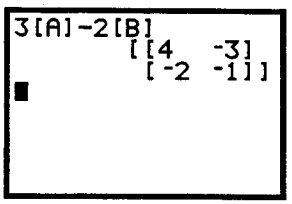
4.



5.



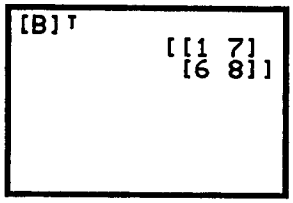
6.



Copyright © by Pencil Point Press, Inc.

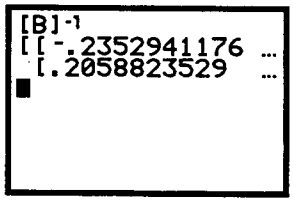
Practice 18:

1.

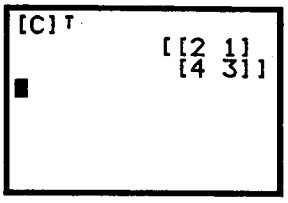


2. -34

3.

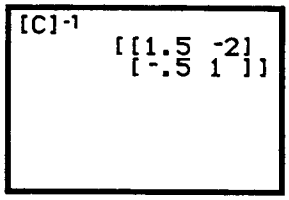


4.



5. 2

6.

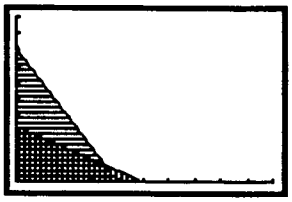


Practice 19:

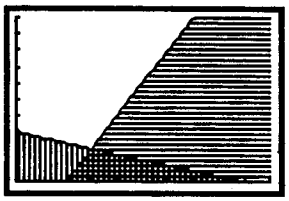
1. 18, 14 **2.** -.29, -3,86 **3.** 4.5, 3 **4.** 0, 1.25

Practice 20:

1.



2.



Practice 21:

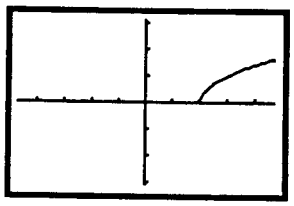
1. P(0,0)=min, P(5,0)=max **2.** P(0,3)=min, P(2,0)= max

3. P(1,0)=min, P(2.5,0)=max **4.** P(0,-2)=min, P(4,0)=max

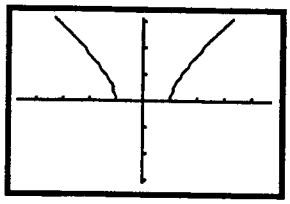
Copyright © by Pencil Point Press, Inc.

Practice 22:

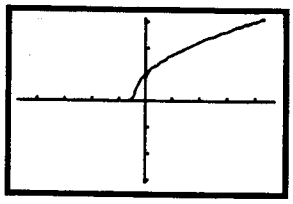
1.



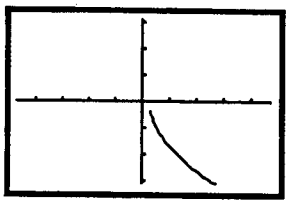
2.



3.



4.



Practice 23:

1. 3+7i, -1-i, -10+10i, .7+.1i

2. 1+6i, -5+4i, -11+13i, -.1+1.7i

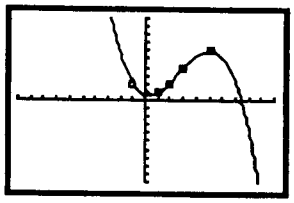
3. 3+2i, -1-8i, 17-i, -.45-.38i

4. 4+5i, 6-i, -11+13i, .1-1.7i

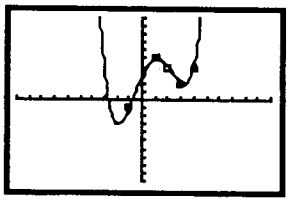
5. 6+i, 2+5i, 14-2i, .25+1.75i

Practice 24:

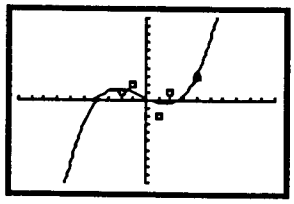
1.



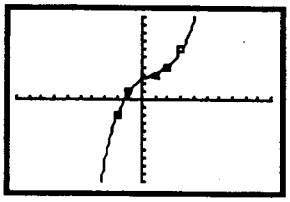
2.



3.



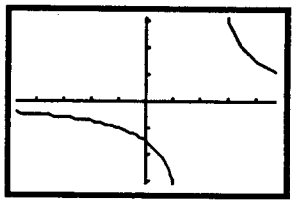
4.



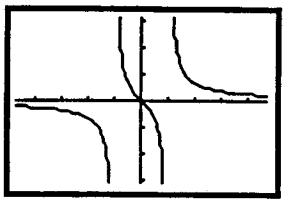
Copyright © by Pencil Point Press, Inc.

Practice 25:

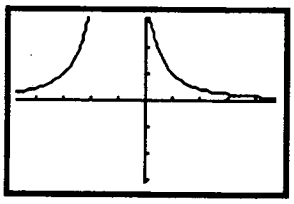
1.



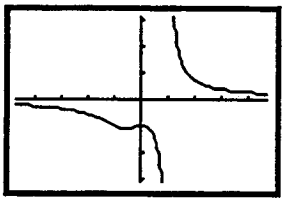
2.



3.



4.



Practice 26:

1. 6.97×10^{-8}

2. .200, .111, .037, .012, .004, .001, 4.57×10^{-4}, 1.52×10^{-4}

3. 9.09×10^{-13}

4. .25, .063, .016, .004, 9.76×10^{-4}, 2.44×10^{-4}, 6.10×10^{-5} 1.53×10^{-5}, 3.81×10^{-6}, 9.54×10^{-7}

Practice 27:

1. .220

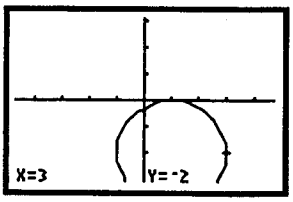
2. 5, 4, 3.2, 2.56, 2.048, 1.638, 1.311, 1.049

3. .405

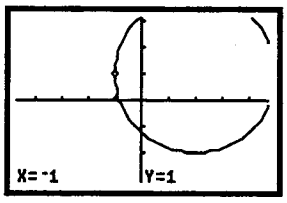
4. 3, 2.7, 2.43, 2.187, 1.968, 1.771, 1.594, 1.435, 1.291, 1.162

Practice 28:

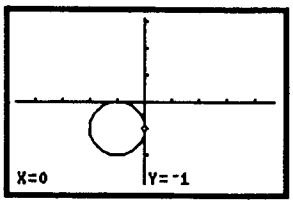
1.



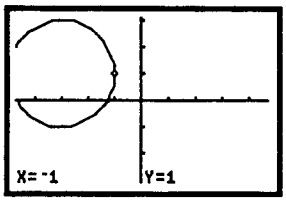
2.



3.



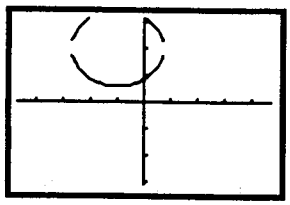
4.



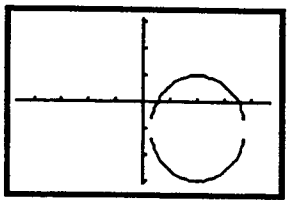
Copyright © by Pencil Point Press, Inc.

Practice 29:

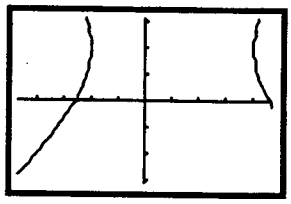
1.



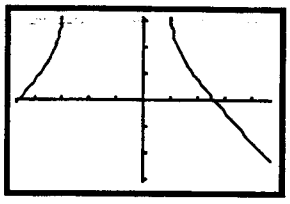
2.



3.



4.



Practice 30:

1. 56 **2.** 6720 **3.** 35 **4.** 840 **5.** 15 **6.** 30

7. 84 **8.** 504

Practice 31:

1. .019 **2.** .167 **3.** .077 **4.** 0 **5.** .133 **6.** .33

Practice 32:

1. 1. .6, .8, .75, .8, .6, 1.33 **2.** .4706, .8824, .5333, .8824, .4706, 1.875

Copyright © by Pencil Point Press, Inc.