MAT 161 Names:_____

1. Use the power rule to find $f'(3)$ for the following:

a) $f(x)=x^2-4x+1$ $f'(x)=2x-4$

$f'(3)=2\cdot 3-4=\underline{2}$

b) $f(x)=\dfrac{1}{x-1}$ $f(x)=(x-1)^{-1}$

$f'(x)=-1(x-1)^{-2}=-1\cdot\dfrac{1}{(x-1)^2}=\dfrac{-1}{(x-1)^2}$

$f'(3)=\dfrac{-1}{(3-1)^2}=-\dfrac{1}{4}$

c) $f(x)=\sqrt{x+4}$ $f(x)=(x+4)^{1/2}$

$f'(x)=\frac{1}{2}(x+4)^{-1/2}=\frac{1}{2}\cdot\dfrac{1}{(x+4)^{1/2}}=\dfrac{1}{2\sqrt{x+4}}$

$f'(3)=\dfrac{1}{2\sqrt{3+4}}=\dfrac{1}{2\sqrt{7}}$

2. Find the derivatives. Then check the reasonableness of your answer by graphing $f(x)$ and $f'(x)$ on the same axes: (Note: Each of these must be re-written in order to differentiate.)

a) $f(x)=\dfrac{3x-1}{x}\rightarrow f(x)=\dfrac{3x}{x}-\dfrac{1}{x}\rightarrow f(x)=3-x^{-1}$

$f'(x)=-(-1)x^{-2}=x^{-2}=\dfrac{1}{x^2}$

b) $f(x)=\dfrac{2\sqrt{x}-3}{x}\rightarrow f(x)=\dfrac{2x^{\frac{1}{2}}-3}{x}\rightarrow f(x)=\dfrac{2x^{1/2}}{x}-\dfrac{3}{x}\rightarrow f(x)=2x^{-\frac{1}{2}}-3x^{-1}$

$f'(x)=2\cdot-\frac{1}{2}x^{-\frac{3}{2}}-3(-1)x^{-2}$

$=-x^{-\frac{3}{2}}+3x^{-2}$

$=\dfrac{-1}{x^{3/2}}+\dfrac{3}{x^2}$ OR $\dfrac{x^{\frac{1}{2}}}{x^{1/2}}\cdot\dfrac{-1}{x^{3/2}}+\dfrac{3}{x^2}$

$=\dfrac{-1}{\sqrt{x^3}}+\dfrac{3}{x^2}$ $=\dfrac{-x^{\frac{1}{2}}}{x^2}+\dfrac{3}{x^2}$

$=\dfrac{-\sqrt{x}+3}{x^2}$