Exercises

In Exercises 1–8, compute $f'(x)$ using the limit definition.

1. $f(x) = 4x - 3$
2. $f(x) = x^2 + x$
3. $f(x) = 1 - 2x^2$
4. $f(x) = x^3$
5. $f(x) = x^{-1}$
6. $f(x) = \dfrac{x}{x-1}$
7. $f(x) = \sqrt{x}$
8. $f(x) = x^{-1/2}$

In Exercises 9–16, use the Power Rule to compute the derivative.

9. $\left.\dfrac{d}{dx}x^4\right|_{x=-2}$
10. $\left.\dfrac{d}{dx}x^{-4}\right|_{x=3}$
11. $\left.\dfrac{d}{dt}t^{2/3}\right|_{t=8}$
12. $\left.\dfrac{d}{dt}t^{-2/3}\right|_{t=1}$
13. $\dfrac{d}{dx}x^{0.35}$
14. $\dfrac{d}{dx}x^{14/3}$
15. $\dfrac{d}{dt}t^{\sqrt{17}}$
16. $\dfrac{d}{dt}t^{-\pi^2}$

In Exercises 17–20, compute $f'(a)$ and find an equation of the tangent line to the graph at $x = a$.

17. $f(x) = x^5, \quad x = 1$
18. $f(x) = x^{-2}, \quad x = 3$
19. $f(x) = 3\sqrt{x} + 8x, \quad x = 9$
20. $f(x) = \sqrt[3]{x}, \quad x = 8$

In Exercises 21–32, calculate the derivative of the function.

21. $f(x) = x^3 + x^2 - 12$
22. $f(x) = 2x^3 - 3x^2 + 2x$
23. $f(x) = 2x^3 - 10x^{-1}$
24. $f(x) = x^5 - 7x^2 + 10x + 9$
25. $g(z) = 7z^{-3} + z^2 + 5$
26. $h(t) = 6\sqrt{t} + \dfrac{1}{\sqrt{t}}$
27. $f(s) = \sqrt[4]{s} + \sqrt[3]{s}$
28. $W(y) = 6y^4 + 7y^{2/3}$
29. $f(x) = (x+1)^3$ (*Hint:* Expand)
30. $R(s) = (5s+1)^2$
31. $P(z) = (3z-1)(2z+1)$
32. $q(t) = \sqrt{t}(t+1)$

In Exercises 33–38, calculate the derivative indicated.

33. $f'(2), \quad f(x) = \dfrac{3}{x^4}$
34. $y'(16), \quad y = \dfrac{\sqrt{x}+1}{x}$
35. $\left.\dfrac{dT}{dC}\right|_{C=8}, \quad T = 3C^{2/3}$
36. $\left.\dfrac{dP}{dV}\right|_{V=-2}, \quad P = \dfrac{7}{V}$
37. $\left.\dfrac{ds}{dz}\right|_{z=2}, \quad s = 4z - 16z^2$
38. $\left.\dfrac{dR}{dW}\right|_{W=1}, \quad R = W^{\pi}$

39. Match the functions in graphs (A)–(D) with their derivatives (I)–(III) in Figure 11. Note that two of the functions have the same derivative. Explain why.

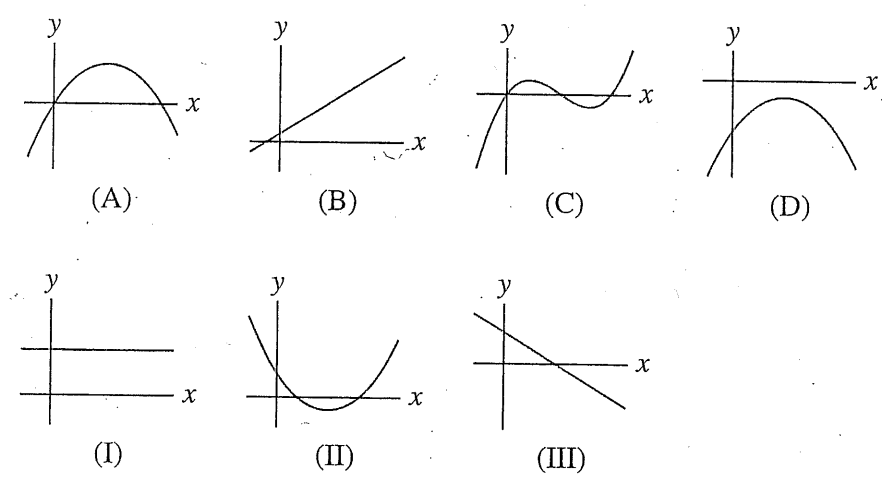

FIGURE 11