12-4 Derivatives

Evaluate limits to find the derivative of each function. Then evaluate the derivative of each function for the given values of each variable.

4. $v(n) = 5n^2 + 9n - 17$; $n = 7$ and 2

ANSWER:

$v'(n) = 10n + 9$; $v'(7) = 79$, $v'(2) = 29$

Find the derivative of each function.

8. $z(n) = 2n^2 + 7n$

ANSWER:

$z'(n) = 4n + 7$

12. $n(t) = \frac{1}{t} + \frac{3}{t^2} + \frac{2}{t^3} + 4$

ANSWER:

$n'(t) = -\frac{1}{t^2} - \frac{6}{t^3} - \frac{6}{t^4}$

16. $f(x) = -5x^3 - 9x^4 + 8x^5$

ANSWER:

$f'(x) = -15x^2 - 36x^3 + 40x^4$

Use the derivative to find any critical points of the function. Then find the maximum and minimum of each graph on the given interval.

20. $r(t) = t^4 + 6t^2 - 2$; [1, 4]

ANSWER:

critical point: (0, −2); max: 350, min: 5

24. $z(k) = k^3 - 3k^2 + 3k$; [0, 3]

ANSWER:

critical point: (1,1); max: 9, min: 0

Find the derivative of each function.

28. $f(x) = (4x + 3)\left(x^2 + 9\right)$

ANSWER:

$f'(x) = 12x^2 + 6x + 36$

32. $g(x) = \left(x^{\frac{3}{2}} + 2x\right)\left(0.5x^4 - 3x\right)$

ANSWER:

$g'(x) = \frac{11}{4}x^{\frac{9}{2}} + 5x^4 - \frac{15}{2}x^{\frac{3}{2}} - 12x$

36. $f(x) = (1.4x^5 + 2.7x)(7.3x^9 - 0.8x^5)$

ANSWER:

$f'(x) = 143.08x^{13} + 185.9x^9 - 12.96x^5$

Use the Quotient Rule to find the derivative of each function.

40. $g(n) = \frac{3n + 2}{2n + 3}$

ANSWER:

$g'(n) = \frac{5}{(2n + 3)^2}$

44. $c(m) = \frac{m^4 + 1}{-m^3 + 2m}$

ANSWER:

$c'(m) = \frac{-m^6 + 6m^4 + 3m^2 - 2}{(-m^3 + 2m)^2}$

48. $m(x) = \frac{x^5 + 3x}{-x^4 - 2x^3 - 2x - 3}$

ANSWER:

$m'(x) = \frac{-x^8 - 4x^7 - 8x^5 - 6x^4 + 12x^3 - 9}{\left(-x^4 - 2x^3 - 2x - 3\right)^2}$

Find the equation of the line tangent to $f(x)$ at the given point. Verify your answer graphically.

52. $f(x) = -0.2x^2 + 1.5x - 0.75$; (5, 1.75)

ANSWER:

$y = -0.5x + 4.25$