TAKING THE DERIVATIVE

Differentiate each of the following equations.

1) $y = 3x^4 + 2x^3 - 5x + 7$

$\frac{dy}{dx} = 12x^3 + 6x^2 - 5$

2) $y = 6x^5 - 4x^2 + 9x - 1$

$\frac{dy}{dx} = 30x^4 - 8x + 9$

3) $y = 2x^3 + 7x^2 - 3x + 8$

$\frac{dy}{dx} = 6x^2 + 14x - 3$

4) $y = 9x^4 - x^3 + 6x - 2$

$\frac{dy}{dx} = 36x^3 - 3x^2 + 6$

5) $y = 5x^6 + 3x^2 - 4x + 10$

$\frac{dy}{dx} = 30x^5 + 6x - 4$

6) $y = 7x^3 - 2x^2 + x - 9$

$\frac{dy}{dx} = 21x^2 - 4x + 1$

7) $y = 4x^5 + x^4 - 8x + 6$

$\frac{dy}{dx} = 20x^4 + 4x^3 - 8$

8) $y = 8x^3 + 5x^2 - 6x + 3$

$\frac{dy}{dx} = 24x^2 + 10x - 6$

9) $y = 10x^4 - 3x^3 + 2x^2 - x$

$\frac{dy}{dx} = 40x^3 - 9x^2 + 4x - 1$

10) $y = x^5 + 6x^3 - 2x^2 + 4$

$\frac{dy}{dx} = 5x^4 + 18x^2 - 4x$

11) $y = 12x^3 - 7x + 5$

$\frac{dy}{dx} = 36x^2 - 7$

12) $y = 3x^7 - 2x^3 + x$

$\frac{dy}{dx} = 21x^6 - 6x^2 + 1$

13) $y = 6x^4 + 4x^3 - x + 2$

$\frac{dy}{dx} = 24x^3 + 12x^2 - 1$

14) $y = 11x^2 - 5x + 9$

$\frac{dy}{dx} = 22x - 5$

15) $y = 2x^6 - x^4 + 3x^2 - 7$

$\frac{dy}{dx} = 12x^5 - 4x^3 + 6x$

16) $y = 9x^5 - 4x^2 + 8$

$\frac{dy}{dx} = 45x^4 - 8x$

17) $y = x^8 + 2x^3 - 6x$

$\frac{dy}{dx} = 8x^7 + 6x^2 - 6$

18) $y = 5x^4 - 9x^2 + 4x - 1$

$\frac{dy}{dx} = 20x^3 - 18x + 4$

19) $y = 7x^3 + 3x^2 - 2x + 6$

$\boldsymbol{\frac{dy}{dx} = 21x^2 + 6x - 2}$

20) $y = 4x^6 - 5x^3 + x - 8$

$\boldsymbol{\frac{dy}{dx} = 24x^5 - 15x^2 + 1}$

21) $y = \frac{1}{x^2} + 3x^3$

$y = x^{-2} + 3x^3$

$\boldsymbol{\frac{dy}{dx} = -2x^{-3} + 9x^2}$

22) $y = \frac{5}{x} - 2x^2$

$y = 5x^{-1} - 2x^2$

$\boldsymbol{\frac{dy}{dx} = -5x^{-2} - 4x}$

23) $y = \sqrt{x} + 4x^2$

$y = x^{\frac{1}{2}} + 4x^2$

$\boldsymbol{\frac{dy}{dx} = \frac{1}{2}x^{-\frac{1}{2}} + 8x}$

24) $y = 6\sqrt[2]{x^3} - \frac{1}{x}$

$y = 6x^{\frac{3}{2}} - x^{-1}$

$\boldsymbol{\frac{dy}{dx} = 9x^{\frac{1}{2}} + x^{-2}}$

25) $y = \frac{1}{x^3} + 2\sqrt{x}$

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

$\boldsymbol{\frac{dy}{dx} = -3x^{-4} + x^{-\frac{1}{2}}}$

26) $y = 7\sqrt[3]{x} - \frac{5}{x^2}$

$y = 7x^{\frac{1}{3}} - 5x^{-2}$

$\boldsymbol{\frac{dy}{dx} = \frac{7}{3}x^{-\frac{2}{3}} + 10x^{-3}}$

27) $y = \frac{1}{\sqrt{x}} + x^4$

$y = x^{-\frac{1}{2}} + x^4$

$\boldsymbol{\frac{dy}{dx} = -\frac{1}{2}x^{-\frac{3}{2}} + 4x^3}$

28) $y = 3\sqrt[2]{x^3} - \frac{1}{x^4}$

$y = 3x^{\frac{3}{2}} - x^{-4}$

$\boldsymbol{\frac{dy}{dx} = \frac{9}{2}x^{\frac{1}{2}} + 4x^{-5}}$

29) $y = \sqrt{x^5} + \frac{2}{x^3}$

$y = x^{\frac{5}{2}} + 2x^{-3}$

$\boldsymbol{\frac{dy}{dx} = \frac{5}{2}x^{3/2} - 6x^{-4}}$

30) $y = \frac{4}{\sqrt[3]{x}} + x^3$

$y = 4x^{-\frac{1}{3}} + x^3$

$\boldsymbol{\frac{dy}{dx} = -\frac{4}{3}x^{-\frac{4}{3}} + 3x^2}$

31) $y = (x + 2)(x + 5)$

$y = x^2 + 5x + 2x + 10$

$y = x^2 + 7x + 10$

$\boldsymbol{\frac{dy}{dx} = 2x + 7}$

32) $y = (2x - 3)(x + 4)$

$y = 2x^2 + 8x - 3x - 12$

$y = 2x^2 + 5x - 12$

$\boldsymbol{\frac{dy}{dx} = 4x + 5}$

33) $y = (x + 1)(x + 2)(x + 3)$

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

$y = (x + 1)(x^2 + 5x + 6)$

$y = x^3 + 5x^2 + 6x + x^2 + 5x + 6$

$y = x^3 + 6x^2 + 11x + 6$

$\boldsymbol{\frac{dy}{dx} = 3x^2 + 12x + 11}$

34) $y = 2x^3 - \frac{1}{x} + 4\sqrt{x}$

$y = 2x^3 - x^{-1} + 4x^{\frac{1}{2}}$

$\boldsymbol{\frac{dy}{dx} = 6x^2 + x^{-2} + 2x^{-\frac{1}{2}}}$

35) $y = (x^2 + 2x)\left(\frac{1}{x} + 3\right)$

$y = x + 3x^2 + 2 + 6x$

$y = 3x^2 + 7x + 2$

$\boldsymbol{\frac{dy}{dx} = 6x + 7}$

36) $y = \frac{4x^6 + 6x^2}{2}$

$y = 2x^6 + 3x^2$

$\boldsymbol{\frac{dy}{dx} = 12x^5 + 6x}$

37) $y = \frac{x^6 - 3x^4}{x}$

$y = x^5 - 3x^3$

$\boldsymbol{\frac{dy}{dx} = 5x^4 - 9x^2}$

38) $y = \frac{7x^2(3-x)}{2x}$

$y = \frac{21x^2 - 7x^3}{2x}$

$y = \frac{21}{2}x - \frac{7}{2}x^2$

$\boldsymbol{\frac{dy}{dx} = \frac{21}{2} - 7x}$

39) $y = \frac{8x^3 - 9x}{2x^2}$

$y = 4x - \frac{9}{2x}$

$y = 4x - \frac{9}{2}x^{-1}$

$\boldsymbol{\frac{dy}{dx} = 4 + \frac{9}{2}x^{-2}}$

40) $y = \frac{5x^6 + 3x^4}{\sqrt[3]{x^2}}$

$y = 5x^{\frac{16}{3}} + 3x^{\frac{10}{3}}$

$\boldsymbol{\frac{dy}{dx} = \frac{80}{3}x^{\frac{13}{3}} + 10x^{\frac{7}{3}}}$