

Handout - Derivative - Power Rule II

Calculate the derivative and Evaluate at the indicated value of x .

a) Evaluate $f'(3)$ for $f(x) = 13x^5$

b) Evaluate $f'(2)$ for $f(x) = 10x^3$

c) Evaluate $f'(-3)$ for $f(x) = 2x^4$

d) Evaluate $f'(1)$ for $f(x) = 5x^3$

e) Evaluate $f'(-\frac{7}{2})$ for $f(x) = 5x^3$

f) Evaluate $f'(\frac{5}{2})$ for $f(x) = x$

g) Evaluate $f'(\frac{2}{3})$ for $f(x) = 7x^2$

h) Evaluate $f'(-\frac{2}{5})$ for $f(x) = 8x^4$

i) Evaluate $f'(2)$ for $f(x) = \frac{11x^{9/2}}{6}$

j) Evaluate $f'(1)$ for $f(x) = \frac{12x^{5/3}}{7}$

k) Evaluate $f'(2)$ for $f(x) = \frac{5x^{3/7}}{2}$

l) Evaluate $f'(3)$ for $f(x) = \frac{3x^{7/6}}{2}$

Answers a) 5265; b) 120; c) -216; d) 15;

e) $\frac{735}{4}$; f) 1; g) $\frac{28}{3}$; h) $-\frac{256}{125}$;

i) $66\sqrt{2}$; j) $\frac{20}{7}$; k) $\frac{15}{14 \cdot 2^{4/7}}$; l) $\frac{7\sqrt[6]{3}}{4}$;

Calculate the derivative with respect to the independent variable

a) $f(\gamma) = \frac{4\gamma^5}{9} + \gamma^3 - 19\gamma$

b) $h(\alpha) = \frac{9\alpha^6}{2} - 3\alpha^3 - 17\alpha$

c) $g(\sigma) = -\frac{14}{\sqrt[4]{\sigma}} - \sigma^{13/3} + \sigma^{11/2}$

d) $k(\beta) = -\frac{18}{\sqrt[5]{\beta}} - 2\beta^{10/3} + \frac{7\beta^{17/2}}{8}$

Calculate the following

a) $\left. \frac{dk}{dx} \right|_{x=0}$ for $k = 2x^2 - 2x - 19$

b) $\left. \frac{dk}{ds} \right|_{s=2}$ for $k = s^3 + 2s + 2$

c) $\left. \frac{dr}{dx} \right|_{x=3}$ for $r = 4x^3 - 4x - 15$

d) $\left. \frac{dv}{dt} \right|_{t=1}$ for $v = 3t^3 + 9t - 16$

Find the equation of the tangent line ($y = mx + b$) at the indicated point.

a) $y = x^2 - 2x + 6$ at $x = -1$

b) $y = 3x^2 - x + 6$ at $x = -2$

c) $y = 3x^2 + 7x + 7$ at $x = 3$

d) $y = 3x^2 + 9x + 3$ at $x = 1$

e) $y = 2x^3 - 9x + 8$ at $x = 3$

f) $y = x^3 - 8x + 8$ at $x = 0$

g) $y = 6 - 9x$ at $x = -3$

h) $y = 9x + 2$ at $x = -1$

i) $y = x^{3/2} + 2$ at $x = 3$

j) $y = 7x^{3/2} + 8$ at $x = 2$

Answers a) $f'(\gamma) = \frac{20\gamma^4}{9} + 3\gamma^2 - 19$; b) $h'(\alpha) = 27\alpha^5 - 9\alpha^2 - 17$;

c) $g'(\sigma) = \frac{7}{2\sigma^{5/4}} - \frac{13\sigma^{10/3}}{3} + \frac{11\sigma^{9/2}}{2}$; d) $k'(\beta) = \frac{18}{5\beta^{6/5}} - \frac{20\beta^{7/3}}{3} + \frac{119\beta^{15/2}}{16}$;

Answers a) -2 , using $k' = 4x - 2$ at $x = 0$; b) 14 , using $k' = 3s^2 + 2$ at $s = 2$;

c) 104 , using $r' = 12x^2 - 4$ at $x = 3$; d) 18 , using $v' = 9t^2 + 9$ at $t = 1$;

Answers a) $y = 5 - 4x$; b) $y = -13x - 6$; c) $y = 25x - 20$; d) $y = 15x$; e) $y = 45x - 100$; f) $y = 8 - 8x$; g) $y = 6 - 9x$; h) $y = 9x + 2$; i) $y = \frac{3\sqrt{3}x}{2} - \frac{3\sqrt{3}}{2} + 2$; j) $y = \frac{21x}{\sqrt{2}} - 7\sqrt{2} + 8$;