Solutions

The Power Rule

The Power Rule

Q1) a) $f(x) = 4x^2$

$f'(x) = 8x$

b) $f(x) = 3x^3 + \frac{1}{2}$

$f'(x) = 9x^2$

c) $y = 5x^{-2}$

$\frac{dy}{dx} = -10x^{-3}$

d) $f(x) = x^{\frac{1}{3}}$

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

e) $y = \pi x$

$\frac{dy}{dx} = \pi$

f) $y = \pi x^4$

$\frac{dy}{dx} = 4\pi x^3$

g) $f(x) = \frac{x^4}{4} = \frac{1}{4}x^4$

$f'(x) = x^3$

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

$\frac{dy}{dx} = \frac{1}{3}x^{-\frac{1}{3}}$

Q2) a) $y = x^2 + 4$

$\frac{dy}{dx} = 2x$

b) $f(x) = \frac{1}{3}x^5 + 2x$

$f'(x) = \frac{5}{3}x^4 + 2$

c) $f(x) = \frac{1}{2}x^{-6} - 3x^2$

$f'(x) = -3x^{-7} - 6x$

d) $y = x^4 + 3x^{-3}$

$\frac{dy}{dx} = 4x^3 - 9x^{-4}$

e) $f(x) = 2 - \pi^2 x^3$

$f'(x) = -3\pi^2 x^2$

f) $g(x) = 4x^2 + 3x^{-3}$

$g'(x) = 8x - 9x^{-4}$

g) $y = 2x^2 + 5x^2$

$\frac{dy}{dx} = 4x + 10x$

h) $h(x) = \frac{1}{3}x^{-3}$

$h'(x) = -x^{-4}$

Q3) a) $f(x) = \frac{1}{x^3}$

$f(x) = x^{-3}$

$f'(x) = -3x^{-4}$

b) $y = \frac{x^2 + 4}{3}$

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

$\frac{dy}{dx} = \frac{2}{3}x$

c) $h(x) = \frac{\pi}{x^{-4}}$

$h(x) = \pi x^4$

$h'(x) = 4\pi x^3$

d) $y = 12\sqrt[3]{x}$

$y = 12x^{\frac{1}{3}}$

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

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

$\frac{dy}{dx} = -\frac{3}{4}x^{-\frac{7}{4}}$

f) $g(x) = \sqrt[4]{x}$

$g(x) = x^{\frac{1}{4}}$

$g'(x) = \frac{1}{4}x^{-\frac{3}{4}}$

g) $f(x) = 3\sqrt{x^3}$

$f(x) = 3x^{\frac{3}{2}}$

$f'(x) = \frac{9}{2}x^{\frac{1}{2}}$

h) $y = \frac{2x^2}{4\sqrt{x^3}}$

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

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