Differentiation Chain Rule – Questions

Q1) Use the chain rule to find the derivative of the following functions.

a) $f(x) = (x + 4)^3$

b) $f(x) = 3(x + 1)^5$

c) $f(x) = (x - 2)^{-3}$

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

e) $f(x) = 5 + (x - 2)^4$

f) $f(x) = 6x^2 - 2(x - 4)^3$

Q2) Use the chain rule to find the derivative of the following functions.

a) $f(x) = (3x + 2)^3$

b) $y = 2(2x - 5)^6$

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

d) $g(x) = 2(1 - 3x)^2$

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

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

Q3) Use the chain rule to find the derivative of the following functions.

a) $f(x) = (4x - 4)^{\frac{1}{2}}$

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

c) $g(x) = \sqrt{(2 - 4x)^3}$

d) $h(x) = \sqrt[4]{(\frac{1}{2}x^2 - 5)^3}$

Q4) Rearrange the function to a form which the chain rule can be used on, then find the derivative.

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

b) $g(x) = \frac{3}{x - 2}$

c) $y = \frac{1}{4(x - 3)}$

d) $f(x) = \sqrt{(2x + 3)}$

e) $y = \sqrt{(6x + 1)^3}$

f) $f(x) = \frac{1}{\sqrt[3]{(2x - 4)}}$

Differentiation Power Rule – Solutions

Q1) a) $f'(x) = 3(x+4)^2$

d) $f'(x) = -8(x+2)^{-3}$

b) $f'(x) = 15(x+1)^4$

e) $f'(x) = 4(x-2)^3$

c) $f'(x) = -3(x-2)^{-4}$

f) $f'(x) = 12x - 6(x-4)^2$

Q2) a) $f'(x) = 9(3x+2)^2$

b) $\frac{dy}{dx} = 24(2x-5)^5$

c) $f'(x) = -8(4x-3)^{-3}$

d) $g'(x) = -12(1-3x)$

e) $\frac{dy}{dx} = 2\left(\frac{1}{2}x+3\right)^3$

f) $f'(x) = 3 + 8(3-2x)^{-3}$

Q3) a) $f'(x) = 2(4x-4)^{-\frac{1}{2}}$

c) $g'(x) = -6(2-4x)^{\frac{1}{2}}$

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

d) $h'(x) = \frac{3}{4}x(\frac{1}{2}x^2 - 5)^{-\frac{1}{4}}$

Q4) a) $f'(x) = -3(x+2)^{-4}$

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

b) $g'(x) = -3(x-2)^{-2}$

e) $\frac{dy}{dx} = 9(6x+1)^{\frac{1}{2}}$

c) $\frac{dy}{dx} = -\frac{1}{4}(x-3)^{-2}$

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