



Questions

The Product Rule

The Quotient Rule

Some of these exercises require familiarity with differentiating trigonometric functions, exponential functions and the chain rule. If you're not already familiar with these check the formula sheet (link in the Useful Links) or come back to this exercise later.

The Product Rule

Q1) Use the product rule to differentiate the following functions with respect to x .

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

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

b) $f(x) = x^3(4 - 4x)$

e) $y = x^{-3}(2x^4 + 7)$

c) $f(x) = (3x + 5)(x^4 - 2)$

f) $y = x^{-\frac{1}{2}}(5 - 4x^{-3})$

Q2) Use the product rule to differentiate the following functions with respect to x .

a) $y = x(1 + 3x)^5$

d) $y = e^{-2x}(2x - 1)^5$

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

e) $y = \sin 2x \cos 3x$

c) $y = x^3(2x + 6)^4$

f) $y = e^x \sin x$



The Quotient Rule

Q1) Use the quotient rule to differentiate the following functions with respect to x .

a) $f(x) = \frac{4x}{2x^3}$

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

b) $y = \frac{7x}{3x + 1}$

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

c) $y = \frac{x^2}{5 - 4x}$

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

Q2) Use the quotient rule to differentiate the following functions with respect to x .

a) $y = \frac{5x}{x + 1}$

d) $y = \frac{e^{4x}}{\cos x}$

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

e) $y = \frac{\ln x}{x + 1}$

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

f) $y = \frac{(e^x + 3)^3}{\cos x}$