

Differentiation - Product Rule 1

1. Differentiate the following (do not forget to consider the chain rule):

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

b) $f(x) = 4x^2(3x + 2)^3$

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

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

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

f) $f(x) = \sqrt[3]{x}(2 - x^2)^5$

2. For the following function, $f(x) = x^3(4x - 3)^2$, find:

a) $f'(x)$

b) Find the gradient of the tangent at $x = 1$

3. For the following function, $f(x) = 2x(5 - 2x)^3$, find:

- a) $f'(x)$
- b) Find the gradient of the tangent at $x = 1$
- c) The equation of the tangent at $x = 1$
- d) The equation of the normal at $x = 1$