

1 Find $f'(x)$ given that $f(x)$ is:

a x^3

b $2x^3$

c $7x^2$

d $6\sqrt{x}$

e $3\sqrt[3]{x}$

f $x^2 + x$

g $4 - 2x^2$

h $x^2 + 3x - 5$

i $\frac{1}{2}x^4 - 6x^2$

j $\frac{3x - 6}{x}$

k $\frac{2x - 3}{x^2}$

l $\frac{x^3 + 5}{x}$

m $\frac{x^3 + x - 3}{x}$

n $\frac{1}{\sqrt{x}}$

o $(2x - 1)^2$

p $(x + 2)^3$

2 Find $\frac{dy}{dx}$ for:

a $y = 2.5x^3 - 1.4x^2 - 1.3$

b $y = \pi x^2$

c $y = \frac{1}{5x^2}$

d $y = 100x$

e $y = 10(x + 1)$

f $y = 4\pi x^3$

3 Differentiate with respect to x :

a $6x + 2$

b $x\sqrt{x}$

c $(5 - x)^2$

d $\frac{6x^2 - 9x^4}{3x}$

e $(x + 1)(x - 2)$

f $\frac{1}{x^2} + 6\sqrt{x}$

g $4x - \frac{1}{4x}$

h $x(x + 1)(2x - 5)$

4 Find the gradient of the tangent to:

a $y = x^2$ at $x = 2$

b $y = \frac{8}{x^2}$ at the point $(9, \frac{8}{81})$

c $y = 2x^2 - 3x + 7$ at $x = -1$

d $y = \frac{2x^2 - 5}{x}$ at the point $(2, \frac{3}{2})$

e $y = \frac{x^2 - 4}{x^2}$ at the point $(4, \frac{3}{4})$

f $y = \frac{x^3 - 4x - 8}{x^2}$ at $x = -1$

- 5 Suppose $f(x) = x^2 + (b + 1)x + 2c$, $f(2) = 4$, and $f'(-1) = 2$. Find the constants b and c .

- 6 Find the gradient function of $f(x)$ where $f(x)$ is:

a $4\sqrt{x} + x$

b $\sqrt[3]{x}$

c $-\frac{2}{\sqrt{x}}$

d $2x - \sqrt{x}$

e $\frac{4}{\sqrt{x}} - 5$

f $3x^2 - x\sqrt{x}$

g $\frac{5}{x^2\sqrt{x}}$

h $2x - \frac{3}{x\sqrt{x}}$

- 7 a If $y = 4x - \frac{3}{x}$, find $\frac{dy}{dx}$ and interpret its meaning.

- b The position of a car moving along a straight road is given by $S = 2t^2 + 4t$ metres where t is the time in seconds. Find $\frac{dS}{dt}$ and interpret its meaning.

- c The cost of producing x toasters each week is given by $C = 1785 + 3x + 0.002x^2$ dollars. Find $\frac{dC}{dx}$ and interpret its meaning.