

Section 1: Introduction to differentiation**Section test**

1. What is the gradient of the curve $y = 3x^2 - 4$ at the point (2, 8)?
2. What is the gradient of the curve $y = x^3 - 2x^2 + x - 3$ at the point where $x = -1$?
3. The function $f(x)$ is given by $f(x) = 2x^2 - 3x + 1$.
What is the value of x for which $f'(x) = 2$?
4. The derivative of $(2x - 1)(x^2 - 3)$ is:
(a) $6x^2 - 2x - 6 + c$ (b) $6x^2 - 2x - 6$
(c) $4x$ (d) $\frac{1}{4}x^4 - \frac{1}{3}x^3 - 3x^2 + 3x + c$
5. The volume $V \text{ cm}^3$ of a cylinder with radius $r \text{ cm}$ is given by $V = 10r^2$.
Find the rate of change of the volume with respect to the radius, at the point when the radius is 5 cm.
6. A curve has equation $y = x^3 - x + 3$.
What is the equation of the tangent to the curve at the point (1, 3)?
What is the equation of the normal to the curve at the point (1, 3)?
7. The normal at the point P to the curve $y = 2 - x^3$ has gradient 3. What is the x -coordinate of P?
(a) 1 (b) $\frac{1}{3}$
(c) $-\frac{1}{3}$ or $\frac{1}{3}$ (d) -1 or 1
8. What are the coordinates of the points on the curve $y = x^3 - 2x^2$ where the gradient is -1 ? Choose all that apply.
(a) (1, -1) (b) (-1 , 1)
(c) ($\frac{1}{3}$, $-\frac{5}{27}$) (d) ($-\frac{1}{3}$, $\frac{5}{27}$)
(e) ($\frac{1}{3}$, -1)
9. The normal to the curve $y = 2x^2 - x + 3$ at the point P (1, 4) meets the curve again at the point Q.
What is the x -coordinate of Q?
10. The tangent to the curve $y = x^3 - 2x^2 + 4$ at the point (2, 4) meets the coordinate axes at the points X and Y.
What is the area of triangle OXY?