

Section 3: Extending the rule**Exercise level 1**

1. Differentiate the following functions

(i) $y = \frac{1}{x^3}$

(ii) $y = \sqrt[3]{x}$

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

(iv) $y = 4\sqrt{x} - \frac{3}{\sqrt{x}}$

(v) $y = 3x^{-5} - 2x^{-7}$

(vi) $y = 2x^{\frac{2}{3}} - 5x^{-\frac{2}{3}}$

(vii) $y = \frac{x^2 - 2x + 3}{2x^2}$

(viii) $y = (x^2 - 2)\sqrt{x}$

2. Find the gradient of each of the following graphs at the given point

(i) $y = 2x - \frac{1}{x}$ at the point (1, 1)

(ii) $y = 3 - \sqrt{x}$ at the point (4, 1)

(iii) $y = x^2\sqrt{x}$ at the point (1, 1)

3. Find the equation of the tangent to the graph $y = \frac{1}{\sqrt{x}}$ at the point where $x = 1$.

4. Find the equation of the normal to the graph $y = \frac{1}{x} - \frac{2}{x^2}$ at the point where $x = 2$.