Section 3: Further integration

Exercise level 3 (Extension)

1. A curve has gradient function

$$\frac{dy}{dx} = x - \frac{8}{\sqrt{x}}$$

(i) Check that $x = 4$ gives a turning point, and determine whether it is a maximum or minimum.

(ii) The curve passes through (16, 88). Find the equation of the curve.

(iii) State any values of x for which the gradient function does not exist, and make a rough sketch of the graph.

2. The area under the graph $y = \sqrt[n]{x}$ between $x = 0$ and $x = 1$ is 0.8. Find the value of n.

3. The value of $\int_1^a \left(x - \frac{k^3}{x^2} \right) dx = 1.5$, and the total area between the graph of $y = x - \frac{k^3}{x^2}$ and the x-axis is 6.5 square units. Both k and a are integers greater than 1. Find the values of k and a.