The Chain Rule

1. Differentiate

(a) $y = (x + 6)^3$ (b) $f(x) = (x - 1)^4$ (c) $f(x) = \dfrac{1}{x + 5}$

(d) $y = \dfrac{2}{x - 4}$ (e) $y = \dfrac{1}{(x + 1)^3}$ (f) $f(x) = \dfrac{4}{(x - 2)^4}$

(g) $y = \dfrac{1}{\sqrt{x + 5}}$ (h) $f(x) = \dfrac{2}{\sqrt{x - 2}}$ (i) $y = (4x + 2)^3$

(j) $f(x) = (2x - 1)^4$ (k) $y = \dfrac{1}{(3x - 4)^2}$ (l) $y = \dfrac{2}{(2x - 4)^3}$

(m) $y = \dfrac{1}{\sqrt{4x - 3}}$ (n) $y = \dfrac{6}{\sqrt{2x + 5}}$ (o) $f(x) = \dfrac{4}{\sqrt[3]{6x + 5}}$

(p) $y = \dfrac{10}{\sqrt[5]{(3x - 2)^2}}$ (q) $f(x) = (x^2 + 3)^3$ (r) $y = 2(x^4 - 1)^3$

2. Find the equation of the tangent to the curve $y = (2x – 1)^3$ at the point where $x = 1$.

3. Find the equation of the tangent to the curve $f(x) = \dfrac{4}{\sqrt{3x + 1}}$ at the point where $x = 1$.

4. A tangent to the curve $y = \dfrac{1}{(2x - 5)^3}$ has gradient –6. Find the point of contact.

5. A curve has equation $y = \dfrac{-25}{x + 3}$. A tangent to this curve is parallel to the line $y = x$. Find the points of contact.

6. Find the coordinates of the stationary point of $y = (3x – 6)^3$ and determine its nature.

7. A curve has equation $f(x) = (2x^2 – 8)^2$. Find the coordinates of the stationary points of $f(x)$ and determine their nature.