

## Section 2: The chain rule

### Exercise level 1

1. Use the chain rule to differentiate the following functions.

(i)  $y = (5x - 2)^5$

(ii)  $y = (2 + 5x)^{-1}$

(iii)  $y = (1 - 3x)^7$

(iv)  $y = (1 - 2x)^{-3}$

2. Using the chain rule, differentiate with respect to  $x$ :

(i)  $(x^2 + 1)^4$

(ii)  $(3x^2 + 5)^{-3}$

(iii)  $(5 - x^3)^4$

(iv)  $(7 - 4x^2)^{-1}$

3. Differentiate the following functions.

(i)  $y = (5x - 2)^{\frac{1}{2}}$

(ii)  $y = (2 - 5x)^{-\frac{1}{3}}$

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

(iv)  $y = (1 - 2x)^{\frac{3}{2}}$

4. Using the chain rule, differentiate with respect to  $x$ :

(i)  $(3x^2 + 1)^{\frac{4}{3}}$

(ii)  $(3 - 2x^2)^{\frac{3}{5}}$

(iii)  $(5 + 2x^3)^{-1\frac{1}{2}}$

(iv)  $(5 - 2x^2)^{-\frac{2}{5}}$

5. Differentiate with respect to  $x$ :

(i)  $\sqrt{6x - 5}$

(ii)  $\sqrt[3]{(x^2 - 2)}$

6. Differentiate with respect to  $x$ :

(i)  $\frac{1}{3x - 2}$

(ii)  $\frac{5}{x^2 - 4x - 3}$

7. Differentiate with respect to  $x$ :

(i)  $\frac{1}{\sqrt{x^3 + 3x}}$

(ii)  $\frac{3}{\sqrt[3]{x^2 + 1}}$

8. Find the gradient of the curve  $y = \frac{1}{2x - 1}$  at the point (1, 1).

9. Find the gradient of the curve  $y = \sqrt{3x^2 - 3x - 2}$  at the point (2, 2).

10. Find the gradient of the curve  $y = \frac{1}{\sqrt{2x - 1}}$  at the point (1, 1).