

- 1**    **a**  $2x$             **b**  $4x^3$             **c**  $1$             **d**  $9x^8$             **e**  $-3x^{-4}$             **f**  $-x^{-2}$   
          **g**  $8x$             **h**  $7$             **i**  $10x^4$             **j**  $0$             **k**  $-16x^{-3}$             **l**  $-44x^{-5}$
- 2**    **a**  $5x^4 + 2x$             **b**  $1 + 3x^2$             **c**  $4x^3$             **d**  $6x^5 - 2$   
          **e**  $18x^2 - 10x^{-3}$             **f**  $2x - 4$             **g**  $-x^{-2} + 5x^{-6}$             **h**  $12x^2 - 12x^{-5}$
- 3**    **a**  $6t^5$             **b**  $-15t^{-4}$             **c**  $\frac{1}{2}t^{-\frac{1}{2}}$             **d**  $\frac{2}{3}t^{-\frac{1}{3}}$             **e**  $\frac{3}{2}t$             **f**  $2t^{-\frac{3}{4}}$   
          **g**  $7t^{\frac{5}{2}}$             **h**  $-\frac{1}{5}t^{-\frac{6}{5}}$             **i**  $\frac{3}{5}t^{\frac{1}{5}}$             **j**  $-\frac{3}{2}t^{-\frac{5}{2}}$             **k**  $-15t^{-\frac{9}{4}}$             **l**  $\frac{2}{9}t^{\frac{1}{3}}$
- 4**    **a**  $2 + 2x^5$             **b**  $\frac{3}{2}x^{\frac{1}{2}}$             **c**  $1 + 2x^{-\frac{1}{2}}$             **d**  $10x^{\frac{2}{3}} + 4x^{-5}$   
          **e**  $-\frac{4}{5}x^{-\frac{9}{5}}$             **f**  $\frac{1}{3}x^{-\frac{5}{6}} + \frac{3}{4}x^{-\frac{1}{4}}$             **g**  $-3x^{-2} + \frac{15}{2}x^{-\frac{5}{2}}$             **h**  $7x^{-2} - \frac{8}{3}x^{-\frac{11}{3}}$
- 5**    **a**  $y = x^{\frac{1}{2}}$             **b**  $y = 4 - x^{-1}$             **c**  $y = 3x^2 + x^{\frac{1}{3}}$             **d**  $y = 9x + 3x^{-1}$   
           $\frac{dy}{dx} = \frac{1}{2}x^{-\frac{1}{2}}$              $\frac{dy}{dx} = x^{-2}$              $\frac{dy}{dx} = 6x + \frac{1}{3}x^{-\frac{2}{3}}$              $\frac{dy}{dx} = 9 - 3x^{-2}$   
          **e**  $y = \frac{1}{4}x^{-1} - x^{-2}$             **f**  $y = 6x^{-\frac{1}{4}}$             **g**  $y = x^{\frac{5}{2}}$             **h**  $y = 8x^{\frac{1}{2}} + \frac{4}{3}x^{-2}$   
           $\frac{dy}{dx} = -\frac{1}{4}x^{-2} + 2x^{-3}$              $\frac{dy}{dx} = -\frac{3}{2}x^{-\frac{5}{4}}$              $\frac{dy}{dx} = \frac{5}{2}x^{\frac{3}{2}}$              $\frac{dy}{dx} = 4x^{-\frac{1}{2}} - \frac{8}{3}x^{-3}$
- 6**    **a**  $s = t^2 + 3t$             **b**  $s = t^2 - 4t + 4$             **c**  $s = 5t^4 + 20t^2$             **d**  $s = 7t^3 - t$   
           $\frac{ds}{dt} = 2t + 3$              $\frac{ds}{dt} = 2t - 4$              $\frac{ds}{dt} = 20t^3 + 40t$              $\frac{ds}{dt} = 21t^2 - 1$   
          **e**  $s = t^2 + 7t + 6$             **f**  $s = t^2 - 2t - 8$             **g**  $s = t^5 + 3t^3 + 9t$             **h**  $s = 2t^3 - 5t^2 + 3t$   
           $\frac{ds}{dt} = 2t + 7$              $\frac{ds}{dt} = 2t - 2$              $\frac{ds}{dt} = 5t^4 + 9t^2 + 9$              $\frac{ds}{dt} = 6t^2 - 10t + 3$
- 7**    **a**  $y = x^{\frac{3}{2}} - 4x^{\frac{1}{2}}$             **b**  $y = x^2 - 2$             **c**  $y = 4x + x^{-1}$             **d**  $y = x^{\frac{1}{2}} + 3x^{-\frac{1}{2}}$   
           $\frac{dy}{dx} = \frac{3}{2}x^{\frac{1}{2}} - 2x^{-\frac{1}{2}}$              $\frac{dy}{dx} = 2x$              $\frac{dy}{dx} = 4 - x^{-2}$              $\frac{dy}{dx} = \frac{1}{2}x^{-\frac{1}{2}} - \frac{3}{2}x^{-\frac{3}{2}}$   
          **e**  $y = 2x^{-1} - \frac{1}{2}x^2$             **f**  $y = 5x^{-2} + x^{-\frac{3}{2}}$             **g**  $y = 3 - \frac{2}{3}x^{-1}$             **h**  $y = 2x^{\frac{1}{2}} + \frac{1}{4}x^{\frac{5}{2}}$   
           $\frac{dy}{dx} = -2x^{-2} - x$              $\frac{dy}{dx} = -10x^{-3} - \frac{3}{2}x^{-\frac{5}{2}}$              $\frac{dy}{dx} = \frac{2}{3}x^{-2}$              $\frac{dy}{dx} = x^{-\frac{1}{2}} + \frac{5}{8}x^{\frac{3}{2}}$
- 8**    **a**  $\frac{dy}{dx} = 8x - 1$             **b**  $\frac{dy}{dx} = 3x^2 + 10x + 2$             **c**  $\frac{dy}{dx} = 2x^{-2}$   
           $\frac{d^2y}{dx^2} = 8$              $\frac{d^2y}{dx^2} = 6x + 10$              $\frac{d^2y}{dx^2} = -4x^{-3}$   
          **d**  $\frac{dy}{dx} = 8x^3 + 6x$             **e**  $y = 3x^4 - 4x^{-2}$             **f**  $\frac{dy}{dx} = 3x^{-\frac{1}{2}} + \frac{1}{2}x^{-\frac{3}{2}}$   
           $\frac{d^2y}{dx^2} = 24x^2 + 6$              $\frac{dy}{dx} = 12x^3 + 8x^{-3}$              $\frac{d^2y}{dx^2} = -\frac{3}{2}x^{-\frac{3}{2}} - \frac{3}{4}x^{-\frac{5}{2}}$   
           $\frac{d^2y}{dx^2} = 36x^2 - 24x^{-4}$