

- 1 a $\frac{1}{2}y^{-\frac{1}{2}}$
 b $y = x^2$
 c $2x$
 d $\frac{dx}{dy} = \frac{1}{2}y^{-\frac{1}{2}} = \frac{1}{2\sqrt{y}} = \frac{1}{2x}$
 $\frac{1}{\left(\frac{dx}{dy}\right)} = \frac{1}{\left(\frac{1}{2x}\right)} = 2x \therefore \frac{dy}{dx} = \frac{1}{\left(\frac{dx}{dy}\right)}$
- 2 a $\frac{dy}{dx} = 2e^{2x-1}$
 $x = \frac{1}{2}(\ln y + 1)$
 $\frac{dx}{dy} = \frac{1}{2y} = \frac{1}{2e^{2x-1}}$
 $\frac{dy}{dx} \times \frac{dx}{dy} = 2e^{2x-1} \times \frac{1}{2e^{2x-1}} = 1$
- b $\frac{dy}{dx} = 3x^2$
 $x = (y-2)^{\frac{1}{3}}$
 $\frac{dx}{dy} = \frac{1}{3}(y-2)^{-\frac{2}{3}} = \frac{1}{3x^2}$
 $\frac{dy}{dx} \times \frac{dx}{dy} = 3x^2 \times \frac{1}{3x^2} = 1$
- c $\frac{dx}{dy} = \frac{1}{2}(\ln y)^{-\frac{1}{2}} \times \frac{1}{y} = \frac{1}{2y\sqrt{\ln y}}$
 $y = e^{x^2}$
 $\frac{dy}{dx} = 2xe^{x^2} = 2y\sqrt{\ln y}$
 $\frac{dy}{dx} \times \frac{dx}{dy} = 2y\sqrt{\ln y} \times \frac{1}{2y\sqrt{\ln y}} = 1$
- 3 a $\frac{dx}{dy} = 2y$
 $\therefore \frac{dy}{dx} = \frac{1}{2y}$
- b $\frac{dx}{dy} = 3(y-1)^2 \times 1$
 $\therefore \frac{dy}{dx} = \frac{1}{3(y-1)^2}$
- c $\frac{dx}{dy} = \sec^2 y$
 $\therefore \frac{dy}{dx} = \cos^2 y$
- d $\frac{dx}{dy} = \frac{1}{3y+2} \times 3$
 $\therefore \frac{dy}{dx} = \frac{3y+2}{3}$
- e $\frac{dx}{dy} = 2 \sin y \cos y = \sin 2y$
 $\therefore \frac{dy}{dx} = \operatorname{cosec} 2y$
- f $\frac{dx}{dy} = \frac{1 \times e^y - (y-2) \times e^y}{(e^y)^2} = \frac{3-y}{e^y}$
 $\therefore \frac{dy}{dx} = \frac{e^y}{3-y}$
- 4 a $\frac{dx}{dy} = 3y^2 - 8y$
 b $y = 3 \therefore x = -9$
 $\frac{dx}{dy} = 3$
 $\therefore \text{grad} = \frac{dy}{dx} = \frac{1}{3}$
 $\therefore y - 3 = \frac{1}{3}(x + 9)$
 $[y = \frac{1}{3}x + 6]$
- 5 a $e^y = ax + b$
 $x = \frac{1}{a}(e^y - b)$
 b $\frac{dx}{dy} = \frac{1}{a}e^y$
 c $\frac{d}{dx} [\ln(ax + b)] = \frac{dy}{dx} = 1 \div \frac{dx}{dy}$
 $= \frac{a}{e^y} = \frac{a}{ax + b}$
- 6 a $\ln y = \ln 3^x = x \ln 3$
 $\therefore x = \frac{\ln y}{\ln 3}$
 b $\frac{dx}{dy} = \frac{1}{\ln 3} \times \frac{1}{y} = \frac{1}{y \ln 3}$
 c $\frac{dy}{dx} = 1 \div \frac{dx}{dy} = y \ln 3$
 $= 3^x \ln 3$
 d $\text{grad} = 9 \ln 3$
 $\therefore y - 9 = (9 \ln 3)(x - 2)$
 $[y = 9x \ln 3 + 9 - 18 \ln 3]$