

C3

DIFFERENTIATION

Worksheet 1

- 1 A curve has the equation $x = \sqrt{y}$.
- Write down $\frac{dx}{dy}$ in terms of y .
 - Express the equation of the curve in the form $y = f(x)$.
 - Write down $\frac{dy}{dx}$ in terms of x .
 - Hence verify that for this curve, $\frac{dy}{dx} = \frac{1}{\left(\frac{dx}{dy}\right)}$.
- 2 Verify the relationship $\frac{dy}{dx} \times \frac{dx}{dy} = 1$ when
- $y = e^{2x-1}$,
 - $y = x^3 + 2$,
 - $x = \sqrt{\ln y}$.
- 3 Find expressions for $\frac{dy}{dx}$ in terms of y in each case.
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|----------------------------|--------------------------|--------------------------------|
| a $x = y^2 + 3$ | b $x = (y - 1)^3$ | c $x = \tan y$ |
| d $x = \ln(3y + 2)$ | e $x = \sin^2 y$ | f $x = \frac{y-2}{e^y}$ |
- 4 The curve C has the equation $x = y^3 - 4y^2$.
- Find $\frac{dx}{dy}$ in terms of y .
 - Find an equation for the tangent to C at the point on the curve with y -coordinate 3.
- 5 Given that $y = \ln(ax + b)$, where a and b are constants,
- express x as a function of y ,
 - find $\frac{dx}{dy}$ in terms of y .
 - Hence, prove that $\frac{d}{dx} [\ln(ax + b)] = \frac{a}{ax + b}$.
- 6 A curve has the equation $y = 3^x$.
- Express the equation of the curve in the form $x = f(y)$.
 - Find $\frac{dx}{dy}$ in terms of y .
 - Hence, find $\frac{dy}{dx}$ in terms of x .
 - Find an equation for the tangent to the curve at the point (2, 9).