

THE GC SCHOOL OF CAREERS

DEPARTMENT OF MATHEMATICS

EXTRA PRACTICE

CORE MATHEMATICS 4

DIFFERENTIATION

EXERCISES

- Find $\frac{dy}{dx}$ for the following implicit functions:
 - $3x^2 + y^2 = 9$
 - $x^2y + y^3 = 2x$
 - $3x^2 - y^2 + 5x - 6y + 5 = 0$
 - $y^3 + x^2y - 2x = 0$
 - $y^3 + x \ln y = 3x^2$
- Given that $\sin y = xy + x^2$, find $\frac{dy}{dx}$ in terms of x and y .
- Find the gradient of the curve $4x^2 + 2xy + y^2 = 12$ at the point $(1,2)$.
- The equation of a curve is $2x^2 + xy + y^2 = 14$.
Show that there are two stationary points on the curve, and find their coordinates.
- Find the equation of the normal to the curve
$$x^3 + 4x^2y + y^3 = 6$$
at the point $(1,1)$, giving your answer in the form $ax + by + c = 0$, where a , b , and c are integers.
- The equation of a curve is $x^2y - xy^2 = 2$.
 - Show that $\frac{dy}{dx} = \frac{y^2 - 2xy}{x^2 - 2xy}$.
 - Show that if $\frac{dy}{dx} = 0$, then $y = 2x$.
 - Hence, find the coordinates of the point on the curve where the tangent is parallel to the x -axis.