

First Principles Method

1. Write $\frac{y_2 - y_1}{x_2 - x_1}$ using the coordinates $(x, x + h)$ etc.

2. Do the algebra on this and cancel all the h terms as far as possible

3. Write “As $h \rightarrow 0$, $\frac{dy}{dx} \rightarrow \dots$ ” (and fill in the expression with $h = 0$)

4. If given specific x value then substitute this into your expression for $\frac{dy}{dx}$

and state gradient at this specific point

Questions to practise...

Find by first principles the gradient of these curves...

a) $y = x^2$

b) $y = x^2 - 4x + 2$

c) $y = x^4$

d) $y = \cos x$