
Earth

Question - Differentiation notation

If you are given a function $f(x)$ and told $y = f(x)$ then list as many different notations as you can for the derivative of f with respect to x .

Question - Differentiation of powers of x

Using the standard result, what is $\frac{dy}{dx}$ if $y = 2x^3$? What if instead $y = \frac{2}{x^3}$?

Question - Differentiation to find gradients

Given that $y = 5x^2 + 3x$ find the gradients of y when $x = -2$ and when $x = 6$.

Question - Differentiation of standard functions

Using a list/table of standard derivatives find the derivative of the following:

- (i) $\sin(x)$
- (ii) $\sin(2x)$
- (iii) $\sin(3x)$
- (iv) $\cos(x)$
- (v) $-\cos(x)$
- (vi) $-2\cos(x)$
- (vii) $-\cos(2x)$
- (viii) \sqrt{x}
- (ix) $\frac{1}{\sqrt{x}}$

Question - Differentiation of real-world formulae

If a charge V , is described by this formula

$$V = \frac{Q}{4\pi\epsilon_0 r}$$

as a function of distance r , then calculate

$$-\frac{dV}{dr}$$

(you may assume that Q , π and ϵ_0 are constants).

Question - Differentiation, trigonometry and graph sketching

Suppose that $f(t) = \sin(t)$, by calculating the derivative of f (with respect to time, t) work out at which values of t the gradient of f is zero.

What does the curve of f look like at these points?

Would your answer be different if $f(t) = 50 \sin(t)$?