

AQA – Differentiation – A2 Mathematics P3

1. June/2021/Paper_7357/3/No.3

$$f(x) = 3x^2$$

Obtain $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

Circle your answer.

[1 mark]

$$\frac{3h^2}{h}$$

$$x^3$$

$$\frac{3(x+h)^2 - 3x^2}{h}$$

$$6x$$

2. June/2021/Paper_7357/3/No.9

A function f is defined for all real values of x as

$$f(x) = x^4 + 5x^3$$

The function has exactly two stationary points when $x = 0$ and $x = -\frac{15}{4}$

(a) (i) Find $f''(x)$

[2 marks]

(a) (ii) Determine the nature of the stationary points.

Fully justify your answer.

[4 marks]

(b) State the range of values of x for which

$$f(x) = x^4 + 5x^3$$

is an increasing function.

[1 mark]

(c) A second function g is defined for all real values of x as

$$g(x) = x^4 - 5x^3$$

(c) (i) State the single transformation which maps f onto g .

[1 mark]

(c) (ii) State the range of values of x for which g is an increasing function.

[1 mark]