

Question 4

(25 marks)

- (a) Differentiate the function  $2x^2 - 3x - 6$  with respect to  $x$  from first principles.

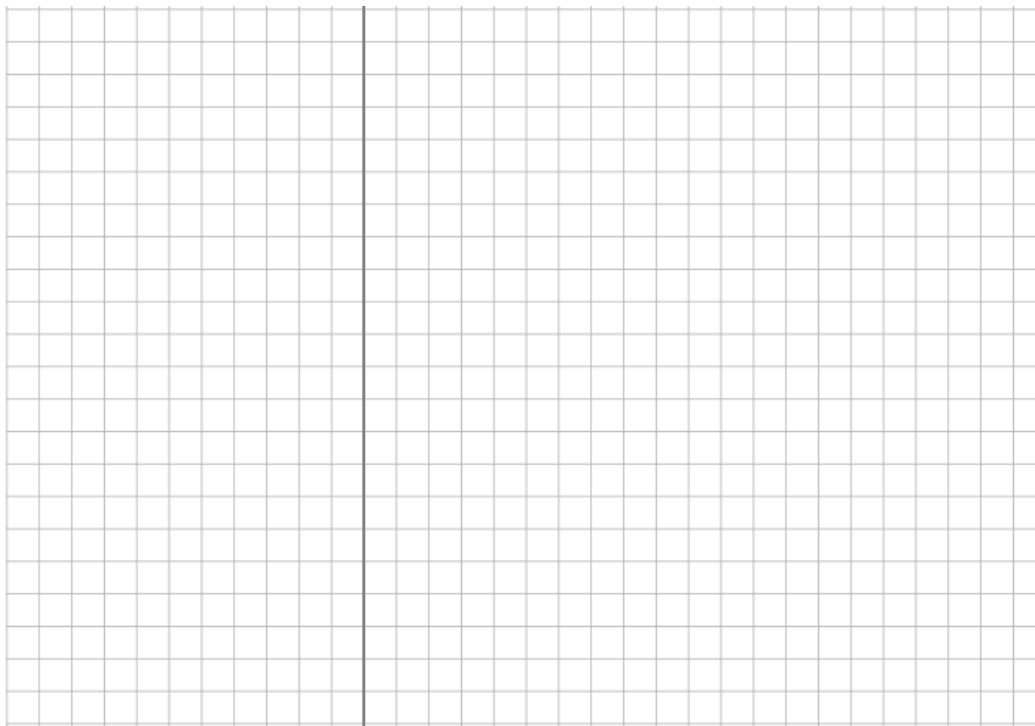
- (b) Let  $f(x) = \frac{2x}{x+2}$ ,  $x \neq -2$ ,  $x \in \mathbb{R}$ . Find the co-ordinates of the points at which the slope of the tangent to the curve  $y = f(x)$  is  $\frac{1}{4}$ .

**Question 6**

**(25 marks)**

(a) Let  $f(x) = e^{-\frac{1}{2}x^2}$ .

Show that the second derivative of  $f(x)$  with respect to  $x$  is  $f''(x) = (x^2 - 1)e^{-\frac{1}{2}x^2}$ .



- (b) The point  $P$  in the first quadrant is a point of inflection of the curve  $y = e^{-\frac{1}{2}x^2}$ . Show that the tangent at  $P$  crosses the  $x$ -axis at  $(2, 0)$ .

