

Q1. A function has the equation  $f(x) = x^2 - \frac{1}{2}x^3$ . AB is a tangent to the function at the point P where  $x = 4$

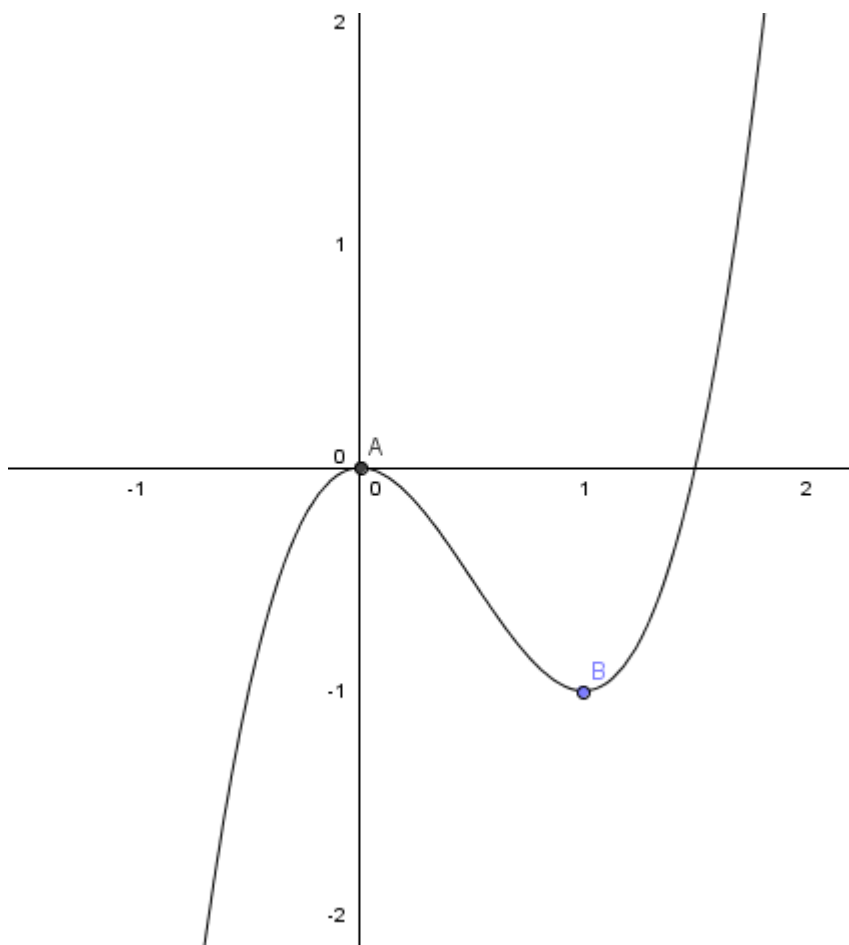
(a) State the equation of AB

(b) Point P also lies on the circumference of a circle with centre (1, -12).  
State the equation of the circle.

Q2. Find the stationary points on the curve  $y = x^3 + 3x^2 - 4$  and state their nature with justification.

Q3. Draw a sketch of the curve  $y = x^3 - 4x^2$  and show on it, the Stationary Points and where the curve cuts the x and y axes.

Q4. Draw a sketch of the derivative of the curve shown



Q5. State the maximum and minimum values of the function

$$f(x) = x^3 + 3.5x^2 - 10x \text{ within the interval } -2 \leq x \leq 4$$

Q6. A farmer wants to create an enclosure by fencing a large part of his field into the shape of a rectangle. He has 100 metres of fencing. Let the length of the field be  $x$  metres

- (i) Express the breadth of the enclosure in terms of  $x$ .
- (ii) Express the area of the field in terms of  $x$ .
- (iii) Find the value of  $x$  that maximises the area of the enclosure.