9. The curve C has equation $y = f(x)$, $x > 0$ where

$$f'(x) = 30 + \frac{6 - 5x^2}{\sqrt{x}}$$

Given that the point $P(4, -8)$ lies on C,

(a) find the equation of the normal to C at P, giving your answer in the form $y = mx + c$, where m and c are constants.

(4)

(b) Find $f(x)$, giving each term in its simplest form.

(5)

(Total for Question 9 is 9 marks)

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10. (a) On the axes in the answer book sketch and clearly label the graphs of

(i) $y = x(a - x)$

(ii) $y = x^2(b - x)$

where a and b are positive constants $b > a$

Show clearly the coordinates of all the points where the curves cross or meet the coordinate axes.

(5)

(b) Show that the x-coordinates of the points of intersection of

$$y = x(4 - x) \quad \text{and} \quad y = x^2(7 - x)$$

are given by the solutions to the equation

$$x(x^2 - 8x + 4) = 0$$

(2)

The point A lies on both of the curves and the x and y coordinates of A are both positive.

(c) Find the exact coordinates of A, leaving the answer in the form $\left(p + q\sqrt{3},\ r + s\sqrt{3}\right)$, where p, q, r and s are integers.

(*Solutions relying on calculator technology are not acceptable.*)

(5)

(Total for Question 10 is 12 marks)

TOTAL FOR PAPER IS 75 MARKS