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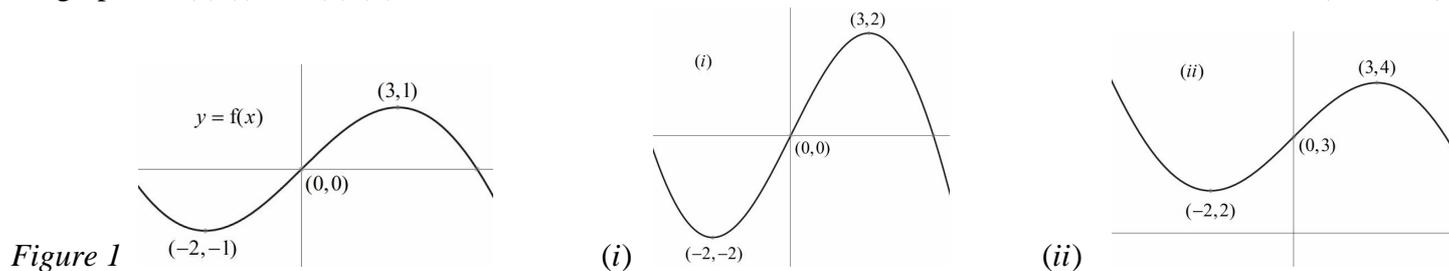
Core Mathematics C1

Advanced Subsidiary

Practice Paper 3

Time: 1 hour 30 minutes

- (1) (a) Part of the curve $y = f(x)$ is shown in *Figure 1* below. The curve has a minimum point at $(-2, -1)$ a maximum point at $(3, 1)$ and passes through the origin. State fully the **single** transformation that maps $f(x)$ onto the graphs of (a) (i) and (b) (ii) shown below. (4 marks)



- (c) Sketch the graph of $y = f(-x)$ stating the coordinates of the maximum and minimum points. (3 marks)

- (2) (a) Find the values of a and b such that $x^4 - 16 \equiv (x^2 + 4)(x + a)(x + b)$ (3 marks)

- (b) Hence or otherwise write down the 2 real solutions to the equation $x^4 - 16 = 0$ (2 marks)

- (3) Simplify $2^{-1} pq^{0.5} \times 2pq^{\frac{3}{2}}$ (3 marks)

- (4) The line l_1 is parallel to the line $3x - 2y = 4$ and passes through the origin O .

- (a) Find an equation for the line l_1 . (3 marks)

- (b) Show that the point $A(8, 12)$ lies on the line l_1 . (1 mark)

- (c) Find an equation for the line perpendicular to l_1 that passes through the midpoint of OA . (4 marks)

- (5) (a) Show that $\frac{2}{3 - \sqrt{8}}$ can be written in the form $6 + a\sqrt{2}$ where a is an integer to be found. (3 marks)

- (b) A rectangle has an area of 2 and side lengths $3 - \sqrt{8}$ and l . Hence or otherwise write down the length of l giving your answer as a simplified surd. (2 marks)

- (6) An arithmetic sequence has first term a and common difference d . Given the 5th term of the sequence is 16 and the sum of the first ten terms is 175, find the 12th term. (6 marks)

- (7) The point $(4, 11)$ lies on the curve $y = f(x)$. Given $\frac{dy}{dx} = \frac{2x^{\frac{3}{2}} - 3}{\sqrt{x}}$ find an expression for $f(x)$. (7 marks)

- (8) The circle $(x - 3)^2 + (y - 2)^2 = 5$ and the line $y = x + 2$ intersect at the points A and B . Find the length AB giving your answer in the form \sqrt{k} where k is an integer to be found. (7 marks)

- (9) (a) Find an equation of the normal to the curve $y = x \left(3 - x^{\frac{3}{2}} \right)$ at the point where $x = 1$. (5 marks)

- (b) The normal to the curve meets the line $y = 2x$ at the point A . Find the coordinates of A . (3 marks)

- (c) Show the line $y = 2x$ pass through the origin O . (1 marks)

- (d) The normal to the curve crosses the y axis at the point B . Find the area of the triangle OBA . (4 marks)

- (10) Show that the function $f(x) = x^2 - 2x + 3$ is positive for all values of x . (5 marks)

- (11) (a) $f(x) = 2x^2 - kx + (k - 1)$. Given the discriminant of $f(x) = -8$, find the value of k . (4 marks)

- (b) Sketch the graph of $y = f(x)$ showing the coordinates of the minimum point. (5 marks)

End of Questions