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Core Mathematics C2

Advanced Subsidiary

Practice Paper 3

Time: 1 hour 30 minutes

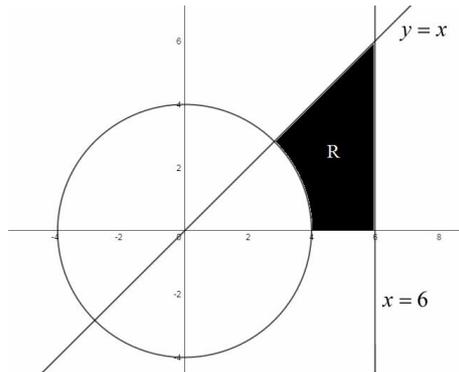
(1) (a) Solve the equation $2\cos(x)\sin(x) = \sin(x)$ for $0^\circ \leq x \leq 360^\circ$ (5 marks)

(b) Hence or otherwise solve the equation $2\cos(2\theta)\sin(2\theta) = \sin(2\theta)$ for $0^\circ \leq \theta \leq 180^\circ$ (3 marks)

(2) $f(x) = px^3 + 2qx^2 - 3x - 5$. Given $(x-1)$ is a factor of $f(x)$ and the remainder is 9 when $f(x)$ is divided by $(x+2)$ find the values of p and q . (6 marks)

(3) Show that $\int_1^4 \sqrt{x}(5-2x)dx = \frac{-22}{15}$. (7 marks)

(4) In the diagram below the circle has centre $(0,0)$ and passes through the points $(4,0)$, $(0,4)$, $(-4,0)$ and $(0,-4)$. Also pictured in the diagram are the lines $y = x$ and $x = 6$.



(a) Find the equation of the circle. (3 marks)

(b) Find the area of the shaded region R in the form $a + b\pi$. (7 marks)

(5) (a) Sketch the graph of $y = 2^x$ showing any points of intersection with the coordinate axis. Write down the equation of the asymptote of the curve. (3 marks)

(b) Solve the equation $2^x = 3$ giving your answer to 3 significant figures. (3 marks)

(c) Using a sketch show there are no real solutions to the equation $2^x = -1$ (2 marks)

(6) (a) Find the terms up to and including the term in x^3 of the binomial expansion $(1-2x)^7$. (4 marks)

(b) Using your answer to part (a) find an approximation for 0.98^7 correct to 4 decimal places. (3 marks)

(c) Explain how you could increase the accuracy of your approximation. (1 mark)

(7) (a) Given $y = \frac{1}{4}x^4 + x^2 - 3x + 5$ find $\frac{dy}{dx}$. (3 marks)

(b) Given $x^3 + 2x - 3 \equiv (x^2 + x + 3)(x-1)$ find any stationary points of the curve $y = \frac{1}{4}x^4 + x^2 - 3x + 5$ and determine their nature. (6 marks)

(8) (a) Fred starts from home (H) and walks on a bearing of 050° for 4km to the point (A). He then walks on a bearing of 120° for 6km to reach the point (B). Find the distance HB to 3 significant figures. (5 marks)

(b) Fred is marking out a field HAB . Find the area of the field to 3 significant figures. (3 marks)

(9) (a) Show that $\frac{\log_2 32 + \log_8 16}{\log_4 8} = \frac{38}{9}$. You must show each step of your workings. (4 marks)

(b) Hence or otherwise solve the equation $\frac{\log_2 32 + \log_8 16}{\log_4 8} = \log_6 x$ correct to 3 significant figures (3 marks)

(c) Given $\log_x y = p$ and $\log_x z = q$ fully simplify $\log_x \frac{x^3 y^4}{z}$. (4 marks)

End of Questions