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	GCE AS/A LEVEL – May/June 2010	9709	21

- 1 EITHER:** State or imply non-modular inequality $(2x - 3)^2 > 5^2$, or corresponding equation or pair of linear equations M1
 Obtain critical values -1 and 4 A1
 State correct answer $x < -1, x > 4$ A1
- OR:** State one critical value, e.g. $x = 4$, having solved a linear equation (or inequality) or from a graphical method or by inspection B1
 State the other critical value correctly B1
 State correct answer $x < -1, x > 4$ B1 [3]
- 2** Obtain integral $\ln(x + 2)$ B1
 Substitute correct limits correctly M1
 Use law for the logarithm of a product, a quotient or a power M1
 Obtain given answer following full and correct working A1 [4]
- 3 (i)** Use $\tan(A \pm B)$ formula to obtain an equation in $\tan x$ M1
 Use $\tan 45^\circ = 1$ and obtain a correct equation in any form A1
 Obtain the given equation correctly A1 [3]
- (ii)** Solve the given quadratic in $\tan x$ and evaluate an inverse tangent M1
 Obtain a correct answer, e.g. 18.4° A1
 Obtain second answer, e.g. 26.6° , and no others in the given interval A1 [3]
 [Treat the giving of answers in radians as a misread. Ignore answers outside the given interval.]
- 4 (i)** Commence division by $x^2 + x - 1$ obtaining quotient of the form $x + k$ M1
 Obtain quotient $x + 2$ A1
 Obtain remainder $3x + 4$ A1
 Identify the quotient and remainder correctly A1√ [4]
- (ii)** Substitute $x = -1$ and evaluate expression M1
 Obtain answer 0 A1 [2]
- 5 (i)** State or imply $2^{-x} = \frac{1}{y}$, or $2^{-x} = y^{-1}$ B1
 Substitute and obtain a 3-term quadratic in y M1
 Obtain the given answer correctly A1 [3]
- (ii)** Solve the given quadratic and carry out correct method for solving an equation of the form $2^x = a$, where $a > 0$ M1
 Obtain answer $x = 1.58$ or 1.585 A1
 Obtain answer $x = 0$ B1 [3]

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- 6 (i) State $2xy + x^2 \frac{dy}{dx}$ as derivative of x^2y B1
 State $2y \frac{dy}{dx}$ as derivative of y^2 B1
 Equate derivatives of LHS and RHS, and solve for $\frac{dy}{dx}$ M1
 Obtain given answer A1 [4]
- (ii) Substitute and obtain gradient $\frac{2}{5}$, or equivalent B1
 Form equation of tangent at the given point (1, 2) M1
 Obtain answer $2x - 5y + 8 = 0$, or equivalent A1 [3]
 [The M1 is dependent on at least one of the B marks being obtained.]
- 7 (i) Make a recognisable sketch of a relevant graph, e.g. $y = 2 - x$ B1
 Sketch an appropriate second graph, e.g. $y = e^{2x}$, and justify the given statement B1 [2]
- (ii) Consider sign of $e^{2x} - (2 - x)$ at $x = 0$ and $x = 0.5$, or equivalent M1
 Complete the argument correctly with correct calculations A1 [2]
- (iii) Show that $e^{2x} = 2 - x$ is equivalent to $x = \frac{1}{2} \ln(2 - x)$, or *vice versa* B1 [1]
- (iv) Use the iterative formula correctly at least once M1
 Obtain final answer 0.27 A1
 Show sufficient iterations to justify its accuracy to 2 d.p., or show there is a sign change in the interval (0.265, 0.275) A1 [3]
- 8 (i) Use quotient rule M1
 Obtain correct derivative in any form A1
 Obtain given result correctly A1 [3]
- (ii) State $\cot^2 x \equiv -1 + \operatorname{cosec}^2 x$, or equivalent B1
 Obtain integral $-x - \cot x$ (f.t. on signs in the identity) B1√
 Substitute correct limits correctly M1
 Obtain given answer A1 [4]
- (iii) Use trig formulae to convert integrand to $\frac{1}{k \sin^2 x}$ where $k = \pm 2$, or ± 1 M1
 Obtain given answer $\frac{1}{2} \operatorname{cosec}^2 x$ correctly A1
 Obtain answer $-\frac{1}{2} \cot x + c$, or equivalent B1 [3]