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	Cambridge International AS Level – October/November 2014	9709	23

1 State or imply correct y–values 6, 4, 0, 8, 24   B1
Use correct formula, or equivalent, with $h = 1$ and five y–values   M1
Obtain 27   A1   [3]

2 State or imply $\ln y = \ln a + x \ln b$ B1
Equate $\ln b$ to numerical gradient of line   M1
Obtain $b = 1.85$ A1
Substitute to find value of a M1
Obtain $a = 3.45$ A1   [5]

3 (a) Express integrand in the form $p \cos\theta + 2$ M1
State correct $2\cos\theta + 2$ A1
Integrate to obtain $2\sin\theta + 2\theta \ (+ c)$ A1   [3]

(b) Integrate to obtain form $k \ln(2x + 3)$ M1

Obtain correct $\dfrac{1}{2}\ln(2x + 3)$ A1

Apply limits correctly   DM1

Obtain $\dfrac{1}{2}\ln 15$ A1   [4]

4 (i) Differentiate to obtain form $k_1 \sin 2x + k_2 \cos x$ M1
Obtain correct $-6\sin 2x - 5\cos x$ A1

Substitute $\dfrac{1}{6}\pi$ to obtain $-\dfrac{11}{2}\sqrt{3}$ or exact equivalent   A1   [3]

(ii) Obtain $6y + 6x\dfrac{dy}{dx}$ as derivative of $6xy$ B1

Obtain $3y^2\dfrac{dy}{dx}$ as derivative of y^3 B1

Obtain $3x^2 + 6y + 6x\dfrac{dy}{dx} + 3y^2\dfrac{dy}{dx} = 0$ or equivalent   B1

Substitute 1 and 2 to find value of gradient dependent on at least one B1   M1

Obtain gradient $-\dfrac{15}{18}$ or $-\dfrac{5}{6}$ A1   [5]

5 (i) State $-40 + 4a + b = 0$ or equivalent   B1
State $-135 + 9a + b = 0$ or equivalent   B1
Solve a pair of linear simultaneous equations   M1
Obtain $a = 19$ and $b = -36$ A1   [4]

(ii) Identify $5x - 6$ as a factor   B1
State $(x + 2)(x + 3)(5x - 6)$ B1

State or imply $5^y = \dfrac{6}{5}$, following a positive value from factorisation   B1√

Apply logarithms and use power law   M1
Obtain 0.113 only   A1   [5]

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6 (i) Use quotient rule or equivalent   M1

Obtain $\dfrac{2x\left(1+e^{3x}\right)-3x^2 e^{3x}}{\left(1+e^{3x}\right)^2}$ or equivalent   A1

Equate first derivative to zero and attempt rearrangement to $x = \ldots$ DM1

Obtain $x = \dfrac{2}{3}\left(1+e^{-3x}\right)$ with sufficient detail and no errors seen (AG)   A1   [4]

(ii) Consider sign of $x - \dfrac{2}{3}\left(1+e^{-3x}\right)$ at 0.7 and 0.8 or equivalent   M1

Obtain correct values (–0.05 and 0.07 or equivalents) and conclude appropriately   A1   [2]

(iii) Use the iterative formula correctly at least once   M1

Obtain final answer 0.739   A1

Show sufficient iterations to 5 decimal places to justify result or show a sign change in the interval (0.7385, 0.7395)   A1   [3]

7 (i) Use $\sec^2 \alpha = 1 + \tan^2 \alpha$ B1

Confirm $3\tan^2 \alpha + 4\tan \alpha - 4 = 0$ B1

Solve quadratic equation for $\tan \alpha$ M1

Obtain, finally, $\tan \alpha = \dfrac{2}{3}$ only   A1   [4]

(ii) State or imply $\tan(\alpha + \beta) = \dfrac{1}{6}$ B1

State $\dfrac{\frac{2}{3} + \tan \beta}{1 - \frac{2}{3}\tan \beta} = \dfrac{1}{6}$, following their value of $\tan \alpha$ B1√

Solve equation of form $\dfrac{a+bt}{c+dt}$ for t M1

Obtain $\tan \beta = -\dfrac{9}{20}$ A1

Conclude with $\cot \beta = -\dfrac{20}{9}$ or exact equivalent   A1   [5]