1 **EITHER** State or imply non-modular inequality $(x-2)^2 \geq (x+5)^2$, or corresponding equation or pair of linear equations — M1

Obtain critical value $-\frac{3}{2}$ — A1

State correct answer $x \leq -\frac{3}{2}$ — A1

OR State a correct linear equation for the critical value, e.g. $x - 2 = -x - 5$, or corresponding correct linear inequality, e.g. $x - 2 \geq -x - 5$ — M1

Obtain critical value $-\frac{3}{2}$ — A1

State correct answer $x \leq -\frac{3}{2}$ — A1 [3]

2 Use law for the logarithm of a product, a quotient or a power — M1*

Obtain $x \log 5 = (2x - 1) \log 3$ or equivalent — A1

Solve for x — M1(dep*)

Obtain answer $x = 1.87$ — A1 [4]

3 Make relevant use of the cos 2θ formula — M1

Obtain a correct quadratic in cos θ — A1

Solve a quadratic in cos θ — M1

Obtain answer $\theta = 60$ and no others in the range — A1 [4]

(Ignore answers outside the given range)

4 **(i)** State $\frac{dx}{dt} = \frac{-2}{1-2t}$ or $\frac{dy}{dt} = -2t^{-2}$ — B1

Use $\frac{dy}{dx} = \frac{dy}{dt} \div \frac{dx}{dt}$ — M1

Obtain given answer correctly — A1 [3]

(ii) Equate derivative to 3 and solve for t — M1

State or imply that $t = -1$ c.w.o. — A1

Obtain coordinates (ln 3, –2) — A1 [3]

5 **(i)** Attempt to integrate and use limits θ and π — M1
Obtain $1 - \sin\theta$ — A1 [2]

(ii) State that area of rectangle = $\theta\cos\theta$, equate area of rectangle to area of R and rearrange to given equation — B1 [1]

(iii) Use the iterative formula correctly at least once — M1
Obtain final answer 0.56 — A1
Show sufficient iterations to justify its accuracy to 2 d.p. or show there is a sign change in the interval (0.555, 0.565) — B1 [3]

6 **(a)** State or imply correct ordinates 0.125, 0.08743…, 0.21511… — B1
Use correct formula, or equivalent, correctly with $h = 0.5$ and three ordinates — M1
Obtain answer 0.11 with no errors seen — A1 [3]

(b) Attempt to expand brackets and divide by e^{2x} — M1
Integrate a term of form ke^{-x} or ke^{-2x} correctly — A1
Obtain 2 correct terms — A1
Fully correct integral $x + 4e^{-x} - 2e^{-2x} + c$ — A1 [4]

7 **(i)** Substitute $x = -1$, equate to zero and obtain a correct equation in any form — B1
Substitute $x = 3$ and equate to 12 — M1
Obtain a correct equation in any form — A1
Solve a relevant pair of equations for a or for b — M1
Obtain $a = -4$ and $b = 6$ — A1 [5]

(ii) Attempt division by $x^2 - 2$ and reach a partial quotient of $2x - k$ — M1
Obtain quotient $2x - 4$ — A1
Obtain remainder -2 — A1 [3]

8 **(i)** Differentiate using chain or quotient rule — M1
Obtain derivative in any correct form — A1
Obtain given answer correctly — A1 [3]

(ii) Differentiate using product rule — M1
State derivative of $\tan\theta = \sec^2\theta$ — B1
Use trig identity $1 + \tan^2\theta = \sec^2\theta$ correctly — M1
Obtain $2\sec^3\theta - \sec\theta$ — A1 [4]

(iii) Use $\tan^2 x = \sec^2\theta - 1$ to integrate $\tan^2 x$ — M1
Obtain $3\sec\theta$ from integration of $3\sec\theta\tan\theta$ — B1
Obtain $\tan\theta - 3\sec\theta$ — A1
Attempt to substitute limits, using exact values — M1
Obtain answer $4 - 3\sqrt{2}$ — A1 [5]