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1 State or imply $y \log 2.8 = x \log 13$ B1

Rearrange into form $y = \dfrac{\log 13}{\log 2.8} x$ or equivalent   B1

Obtain answer $k = 2.49$ B1   [3]

2   **(i)** State or imply correct ordinates 0.27067..., 0.20521..., 0.14936...   B1
Use correct formula, or equivalent, correctly with $h = 0.5$ and three ordinates   M1
Obtain answer 0.21 with no errors seen   A1   [3]

  (ii) Justify statement that the trapezium rule gives an over-estimate   B1   [1]

3 **EITHER** State or imply non-modular inequality $(2x - 1)^2 < (x + 4)^2$, or corresponding equation
or pair of linear equations   M1
Make reasonable solution attempt at a 3-term quadratic, or solve two linear equations   M1
Obtain critical values –1 and 5   A1
State correct answer $-1 < x < 5$ A1   [4]
OR Obtain one critical value, e.g. $x = 5$, by solving a linear equation (or inequality) or
from a graphical method or by inspection   B1
Obtain the other critical value similarly   B2
State correct answer $-1 < x < 5$ B1

4   **(a)** Obtain integral $a \sin 2x$ with $a = \pm \left(1, 2 \text{ or } \dfrac{1}{2}\right)$ M1

Use limits and obtain $\dfrac{1}{2}$ (AG)   A1   [2]

  (b) Use $\tan^2 x = \sec^2 x - 1$ and attempt to integrate both terms   M1
Obtain $3\tan x - 3x$ A1
Attempt to substitute limits, using exact values   M1

Obtain answer $2\sqrt{3} - \dfrac{\pi}{2}$ A1   [4]

5   **(i)** Use product rule   M1
Obtain correct derivative in any form   A1
Show that derivative is equal to zero when $x = 3$ A1   [3]

  (ii) Substitute $x = 1$ into gradient function, obtaining $2e^{-1}$ or equivalent   M1
State or imply required y-coordinate is e^{-1} B1
Form equation of line through $(1, e^{-1})$ with gradient found (NOT the normal)   M1
Obtain equation in any correct form   A1   [4]

6   **(i)** Make a recognisable sketch of a relevant graph, e.g. $y = \ln x$ or $y = 2 - x^2$ B1
Sketch a second relevant graph and justify the given statement   B1   [2]

  (ii) Consider sign of $\ln x - (2 - x^2)$ at $x = 1.3$ and $x = 1.4$, or equivalent   M1
Complete the argument correctly with appropriate calculations   A1   [2]

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    (iii) Show that given equation is equivalent to $x = \sqrt{(2 - \ln x)}$ or *vice versa*   B1   [1]

    (iv) Use the iterative formula correctly at least once   M1
Obtain final answer 1.31   A1
Show sufficient iterations to justify its accuracy to 2 d.p. or show there is a sign change
in the interval (1.305, 1.315)   B1   [3]

7   **(i)** Substitute $x = 3$ and equate to 30   M1
Substitute $x = -1$ and equate to 18   M1
Obtain a correct equation in any form   A1
Solve a relevant pair of equations for a or for b M1
Obtain $a = 1$ and $b = -13$ A1   [5]

    (ii) Either show that f(2) = 0 or divide by $(x - 2)$, obtaining a remainder of zero   B1
Obtain quadratic factor $2x^2 + 5x - 3$ B1
Obtain linear factor $2x - 1$ B1
Obtain linear factor $x + 3$ B1
[Condone omission of repetition that $x - 2$ is a factor.]
[If linear factors $2x - 1$, $x + 3$ obtained by remainder theorem or inspection, award B2 + B1.]   [4]

8   **(i)** Use correct $\sin(A - B)$ and $\cos(A - B)$ formulae   M1
Substitute exact values for $\sin 30°$ etc.   M1
Obtain given answer correctly   A1   [3]

    (ii) State $\sqrt{3} \sin x = \dfrac{1}{2} \sec x$ B1

Rearrange to $\sin 2x = k$, where k is a non-zero constant   M1

Carry out evaluation of $\dfrac{1}{2} \sin^{-1}\left(\dfrac{1}{\sqrt{3}}\right)$ M1

Obtain answer 17.6°   A1
Carry out correct method for second answer   M1
Obtain remaining 3 answers from 17.6°, 72.4°, 197.6°, 252.4° and no others in the
range   A1   [6]
[Ignore answers outside the given range]