

Logarithmic and Exponential Functions 1



Q1.

The variables x and y satisfy the equation $x^n y = C$, where n and C are constants. When $x = 1.10$, $y = 5.20$, and when $x = 3.20$, $y = 1.05$.

- (i) Find the values of n and C . [5]
- (ii) Explain why the graph of $\ln y$ against $\ln x$ is a straight line. [1]
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Q2.

Solve the equation

$$\frac{2^x + 1}{2^x - 1} = 5,$$

giving your answer correct to 3 significant figures. [4]

Q3.

The variables x and y satisfy the equation $y^3 = Ae^{2x}$, where A is a constant. The graph of $\ln y$ against x is a straight line.

- (i) Find the gradient of this line. [2]
- (ii) Given that the line intersects the axis of $\ln y$ at the point where $\ln y = 0.5$, find the value of A correct to 2 decimal places. [2]
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Q4.

Solve the equation

$$\ln(1 + x^2) = 1 + 2 \ln x,$$

giving your answer correct to 3 significant figures. [4]

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Q5.

The polynomial $f(x)$ is defined by

$$f(x) = 12x^3 + 25x^2 - 4x - 12.$$

(i) Show that $f(-2) = 0$ and factorise $f(x)$ completely. [4]

(ii) Given that

$$12 \times 27^y + 25 \times 9^y - 4 \times 3^y - 12 = 0,$$

state the value of 3^y and hence find y correct to 3 significant figures. [3]

Q6.

The curve with equation

$$6e^{2x} + ke^y + e^{2y} = c,$$

where k and c are constants, passes through the point P with coordinates $(\ln 3, \ln 2)$.

(i) Show that $58 + 2k = c$. [2]

(ii) Given also that the gradient of the curve at P is -6 , find the values of k and c . [5]

Q7.

(i) Show that the equation

$$\log_2(x+5) = 5 - \log_2 x$$

can be written as a quadratic equation in x . [3]

(ii) Hence solve the equation

$$\log_2(x+5) = 5 - \log_2 x. [2]$$

Q8.

Use logarithms to solve the equation $5^{2x-1} = 2(3^x)$, giving your answer correct to 3 significant figures. [4]

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Q9.

Using the substitution $u = e^x$, or otherwise, solve the equation

$$e^x = 1 + 6e^{-x},$$

giving your answer correct to 3 significant figures.

[4]

Q10.

Solve the equation $|4 - 2^x| = 10$, giving your answer correct to 3 significant figures.

[3]
