Chapter 2 Logarithmic and Exponential Functions

Oct/Nov 2002

3 (i) Show that the equation
\[ \log_{10}(x + 5) = 2 - \log_{10}x \]
may be written as a quadratic equation in \( x \). \[3\]

(ii) Hence find the value of \( x \) satisfying the equation
\[ \log_{10}(x + 5) = 2 - \log_{10}x. \] \[2\]

Oct/Nov 2003

1 Solve the inequality \(|2^x - 8| < 5\). \[4\]

May/June 2004

4 (i) Show that if \( y = 2^x \), then the equation
\[ 2^x - 2^{-x} = 1 \]
can be written as a quadratic equation in \( y \). \[2\]

(ii) Hence solve the equation
\[ 2^x - 2^{-x} = 1. \] \[4\]

Oct/Nov 2004

2 Solve the equation
\[ \ln(1 + x) = 1 + \ln x, \]
giving your answer correct to 2 significant figures. \[4\]

May/June 2005

1 Given that \( x = 4(5^{-y}) \), express \( y \) in terms of \( x \). \[3\]

2

Two variable quantities \( x \) and \( y \) are related by the equation \( y = Ax^n \), where \( A \) and \( n \) are constants. The diagram shows the result of plotting \( \ln y \) against \( \ln x \) for four pairs of values of \( x \) and \( y \). Use the diagram to estimate the values of \( A \) and \( n \). \[5\]
May/June 2007

4 Using the substitution \( u = 3^x \), or otherwise, solve, correct to 3 significant figures, the equation
\[ 3^x = 2 + 3^{-x}. \]  \[ 6 \]

May/June 2008

2 Solve, correct to 3 significant figures, the equation
\[ e^x + e^{2x} = e^{3x}. \]  \[ 5 \]

Oct/Nov 2008

1 Solve the equation
\[ \ln(x + 2) = 2 + \ln x, \]
giving your answer correct to 3 decimal places.  \[ 3 \]

May/June 2009

1 Solve the equation \( \ln(2 + e^{-x}) = 2 \), giving your answer correct to 2 decimal places.  \[ 4 \]

Oct/Nov 2009/31

2 Solve the equation \( 3^x + 2 = 3^2 + x \), giving your answer correct to 3 significant figures.  \[ 4 \]

Oct/Nov 2009/32

1 Solve the equation
\[ \ln(5 - x) = \ln 5 - \ln x, \]
giving your answers correct to 3 significant figures.  \[ 4 \]

May/June 2010/31

3 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.  \[ 1 \]

May/June 2010/32

1 Solve the equation
\[ \frac{2^x + 1}{2^x - 1} = 5, \]
giving your answer correct to 3 significant figures.  \[ 4 \]
2 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]