AQA, Edexcel, OCR, MEI

A Level

A Level Mathematics

C3 Exponentials and Natural Logarithms

Name:

M M E

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Total Marks: /29

1. Sketch the following functions, clearly indicating and points of intersection with the axis:

    (a) $y = e^x$. [2]

    (b) $y = 2e^{-x}$. [2]

    (c) $y = e^{2x}$. [2]

    (d) $y = \ln x + 1$. [2]

    (e) $y = \ln\left(\frac{1}{2}x\right)$. [2]

2. Solve the following equations. Give your answers to two decimal places when necessary:

    (a) $e^{2x} = 3$. [2]

    (b) $e^{\frac{1}{2}x} = 1$. [2]

    (c) $e^{x^2 - 1} + 2 = 3$. [2]

    (d) $e^{2x} - 5e^x + 6 = 0$ (Give you answer in exact form). [3]

    (e) $xe^x = 3x$. [3]

3. Imagine that you put £100 into a savings account that pays fixed $\beta\%$ interest annually. After t years the balance of the account B is given by:

$$B = 100e^{t \ln 1.02}.$$

    (a) Calculate the value of the account B immediately after the third year. [2]

    (b) How many years will it take for the balance of the account to reach £130? [4]

    (c) Using the laws of logarithms, write the formula for B in the form $B = ak^t$, for some constants a and k to be determined.

    (d) Using your answer to part c), what was the fixed annual interest rate $\beta\%$ of the account? [1]