MATRIX MATH

S3A TOPICAL INTENSIVE REVISION WEEK 5

Total Marks: 30

Topic: Logarithm

1 Given that $u = \log_3 z$, find, in terms of u,

(a) $\log_3 9z$, [1]

(b) $\log_3\left(\frac{z}{27}\right)$, [1]

(c) $\log_z 27$. [2]

2 Solve

(a) $\log_2(3x5) + 3 = \log_2(4x+5)$, [3]

(b) $2\log_3 y - \log_y 27 = 1$. [5]

3 Solve $2\log_7 p = 3 + \log_p 49$. [5]

4 Express $2\log_5 x - \log_5(x-6) = 1$ as a quadratic equation in x and explain why there are no real solutions. [5]

5 The mass, m grams, of a radioactive substance, present at time t years after being observed, is given by the formula $m = 195(0.8)^t$.

(i) Find

(a) the initial mass of the substance, [1]

(b) the mass of the substance when $t = 6$, [1]

(c) the value of t when the mass of the substance is $\frac{1}{4}$ of its initial mass. [4]

Give your answer correct to three significant figures.

(ii) Explain why the mass of the substance can never be more than 195. [1]

(iii) Sketch the graph of m against t, where $t > 0$. [1]

Answer Key

1(a)	$2+u$
1(b)	$u-3$
1(c)	$\frac{3}{u}$
2(a)	$x=2\frac{1}{4}$
2(b)	$y=3\sqrt{3}, \frac{1}{3}$
3	$p=0.378, 49$
4	$x^2-5x+30=0$
5(i)(a)	195 g
5(i)(b)	51.1 g
5(i)(c)	6.21 years
5(ii)	As $t\to\infty$ $0.8^t\to 0$ $195(0.8^t)\to 0$
5(iii)	Sketch graph