Name:
Result:

1. *(2 points)*

The half-life of certain radioactive chemical is 7 minutes. Let $M(t)$ be the mass (in grams) of the chemical after t minutes. The initial mass of the chemical is 32 g.

(a) Write down the equation for $M(t)$.

(b) Find the mass of the chemical after 21 minutes.

2. *(3 points)*

The population of macaques in a certain region of Bangladesh can be modelled by the equation:

$$P(t) = 1200 \times (0.82)^t$$

where t is measured in years since 2020.

a) State the population of macaques in 2020.

b) The population decreases by $p\%$ per year. State the value of p.

c) Describe what happens to $P(t)$ as $t \to \infty$ and interpret this in the context of the question.

3. *(2 points)*

Calculate:

a) $\log_{\sqrt{2}} \frac{1}{4} =$

b) $\log_{3\sqrt[3]{3}} \frac{1}{\sqrt{3}} =$

4. *(9 points)*

Solve the following equations:

a) $\log_3 2x - \log_3(2-x) = 2$

b) $\log_{x+2} 25 = 2$

c) $\log_{36} x = -\frac{1}{2}$

d) $\log_8 \sqrt{x} + \log_8 \sqrt[4]{x} = \frac{1}{2}$

e) $\log x + \log(x-15) = 2$