

MATH 242 SESSION 3 WORKSHEET (SECTIONS 6.5 AND 6.8)

Name: _____.

(1) The half-life of a radioactive isotope is 32 days.

(a) A sample has a mass of 35mg initially. Find a formula for the mass remaining after t days.

(b) Find the mass remaining after 12 days.

(2) A bacteria culture grows with constant relative growth rate. The bacteria count was 260 after 1 hour and 20,000 after 5 hours.

(a) What is the relative growth rate?

(b) What was the initial size of the culture?

(c) Find an expression for the number of bacteria after t hours.

- (3) Compute the following limits. Justify your solution using algebraic manipulations and/or L'Hôpital's rule.

(a) $\lim_{x \rightarrow \infty} \frac{\ln x}{e^x}$

(b) $\lim_{x \rightarrow -\infty} x^2 e^x$

(c) $\lim_{x \rightarrow 0} \frac{x - \tan(x)}{x - \sin(x)}$

(d) $\lim_{x \rightarrow 0} (1 + 7 \sin(x))^{\frac{1}{2x}}$