

AFM Objective 2.01

Exponential & Logarithmic Functions

Solve all problems neatly on a separate sheet of a paper. YOU MUST SHOW ALL WORK FOR CREDIT. NO WORK=NO CREDIT.

Due Thursday, March 29th.

Problem 1: A study showed that the function $m(t) = 60\log(2t + 4)$ approximates the population of mice in a building abandoned 5 years ago with t being the number of months since the building was abandoned.

- Use a table to find the population of the mice after each year. Which year showed the most growth? The least growth?
- Determine the domain and range of the function.
- When will $m(t) = 60$? How do you know?
- Consider the graph of the function $m(t)$. What function would result by shifting the graph 3 units to the right? What would this mean in the context of this problem?

Problem 2: An investment earning 6.5 % annually can be evaluated after t years, using

$$A(t) = A_n e^{0.065t}.$$

- When will a \$1200 investment be valued at \$1600?
- At what rate would it double in 6 years?

Problem 3: On September 25, 2006, Laurinburg NC experienced an earthquake that registered 3.7 on the Richter scale. The Richter scale was revised in 1979 so that R , the magnitude of the earthquake, is defined by $R = 0.67 \log(0.37E) + 1.46$ where E is energy in kilowatt-hours (kWh)

- How much energy was released in this earthquake?
- According to the US Energy Information Administration, for 2013 the average US home used 10,908 kWh for that year. Based on that average, how many months does a US home use an equivalent amount of energy as this earthquake?
- An Indian Ocean tsunami created on December 26, 2004 by an undersea earthquake was one of the largest earthquakes in recorded history. It measured 9.3 on the Richter scale. How much energy was released in this earthquake?

Problem 4: Solve for x . Show all steps.

- $\log_2\left(\frac{x}{6}\right) = 7$
- $\log_3 24 = x - 3$
- $6 \ln x - 2 \ln x = 36$
- $2e^{2x} - 4 = -2$

Problem 5: Solve for x using technology. (Let y_1 = left side, y_2 = right side; find intersection on calc. Answer = value of x)

- $2 \log_3(x - 1) = \log_5(4x^2 - 25)$