

# Math 1410: Worksheet 8

October 15, 2021

Name: \_\_\_\_\_

1. The *Richter scale* for measuring the intensity of an earthquake is based on a logarithmic scale, with an increase of 1 of the scale corresponding to a ten-fold increase in intensity. In other words, the magnitude on the Richter scale is based on the base-10 logarithm of the intensity of the earthquake.
  - (a) How much more intense is a magnitude 8 earthquake than a magnitude 5 earthquake?
  - (b) Two earthquakes hit a city, the first with a magnitude of 3.1 and the second with a magnitude of 4.4 (both magnitudes on the Richter scale). How much more intense is the 4.4 magnitude earthquake compared to the 3.1 magnitude earthquake?
  - (c) A 5.1 magnitude earthquake hits a city, later followed by an earthquake which is 134 times as intense. What is the magnitude of this more intense earthquake on the Richter scale?

2. Ecologists studying a population of frogs think that an exponential growth model is a good model for the size of the population. Based on their measurements over time, they believe that the function

$$F(t) = 1000e^{0.07t}$$

accurately describes the population  $F(t)$ , in number of frogs, given in the number of years  $t$  since they began studying the frogs.

- (a) What was the initial population of frogs when they began the study?
- (b) How many frogs will there be 12 years after the start of the study, according to this model?
- (c) According to this model, how long will it take for the population to double its size from the initial value?
- (d) According to this model, how many frogs will be in the population after 200 years? Do you think this is an accurate prediction? Why or why not?