

**Problem Set 5.1**

**1.)** Label the following functions as exponential growth, exponential decay, or neither. List the growth/decay factor and the growth/decay rate.

a)  $f(x) = 3(5)^x$

b)  $f(x) = 1.9(1.07)^x$

c)  $f(x) = 15(0.9)^x$

d)  $f(x) = (0.63)^x$

d)  $f(x) = \frac{9}{4}(2.4)^x$

f)  $f(x) = 6500(1.63)^x$

**2.)** For each description of an exponential function  $f(x) = a(b)^x$ , find a and b.

a)  $f(0) = 3$  and  $f(1) = 12$

b)  $f(0) = 4$  and  $f(2) = 1$

**3.)** Make up a context or situation for which the relationship between x and y is  $y = 300*(1.02)^x$ .

**4.)** Instead of making a down payment on a house, a couple that lives in an apartment decides to invest \$50,000 that they inherited from Aunt Zelda into a real estate fund that earns 6.3% interest annual interest. Write a function that represents the value of the fund, **A**, after **t** years have passed.

5.) “Researchers at Cornell’s Lab of Ornithology and Canada’s National Wildlife Research Centre found in a 2019 analysis that wild bird populations in the continental U.S. and Canada have declined by 29% - or a total net loss of around three billion bird – since 1970.”

Jiang, Renee. “Bird Populations Declining Fast across North America.” *Emagazine.com*, 2 Dec. 2021, <https://emagazine.com/bird-population-declines/#:~:text=Researchers%20at%20Cornell's%20Lab%20of,three%20billion%20birds%E2%80%94since%201970>.

a) Approximately what was the bird population in 1970?

b) Write a function that gives the total bird population as a function of the number of years that have passed since 1970.

c) What the video at the link [3 Billion Birds Lost](#). What are some of the reasons listed for the loss in birds?

6.) Put the following expressions in your calculator to evaluate.

- a)  $10^{-2}$       b)  $10^{-1}$       c)  $10^0$       d)  $10^1$       e)  $10^2$       f)  $10^3$       g)  $10^4$

7.) Put the following expressions in your calculator to evaluate.



Log key is here!

- a)  $\log(0.01)$       b)  $\log(0.1)$       c)  $\log(1)$       d)  $\log(10)$       e)  $\log(100)$       f)  $\log(1000)$       g)  $\log(10,000)$

8.) Look at your results from questions 6 and 7. What do you notice?