Name: _____ Date: 12/1/14
Pre-Calculus Ms. Wilson

Unit 3: Exponential, Logistic, and Logarithmic Functions
Homework Packet #1 – Due 12/8/14

For questions 1-6, which of the following are exponential functions? For those that are exponential functions, state the initial value and the base. For those that are not, explain why not.

1.) $y = x^8$

2.) $y = 3^x$

3.) $y = 5^x$

4.) $y = 4^2$

5.) $y = x^{\sqrt{x}}$

6.) $y = x^{1.3}$

For questions 7-10, state whether the function is an exponential growth or exponential decay function. Sketch the function, and describe its end behavior using limits.

7.) $f(x) = 3^{-2x}$

8.) $f(x) = \left(\frac{1}{e}\right)^x$

9.) $f(x) = 0.5^x$

10.) $f(x) = 0.75^{-x}$

11.) The number B of bacteria in a petri dish culture after t hours is given by $B = 100e^{0.693t}$.

a.) What was the initial number of bacteria present?

b.) How many bacteria are present after 6 hours?

12.) Using 20th century US census data, the population of New York state can be modeled by $P(t) = \frac{19.875}{1+57.993e^{-0.035335t}}$, where P is the population in millions and t is the number of years since 1800. Based on this model,

a.) What was the population of New York in 1850?

b.) What will New York state's population be in 2010?

c.) What is New York's maximum sustainable population (limit to growth)?

For questions 13-20, determine the exponential function that satisfies the given conditions.

13.) Initial value = 5, increasing at a rate of 17% per year.

14.) Initial value = 52, increasing at a rate of 2.3% per day.

15.) Initial values = 16, decreasing at a rate of 50% per month.

16.) Initial value = 5, decreasing at a rate of 0.59% per week.

17.) Initial population = 28,900, decreasing at a rate of 2.6% per year.

18.) Initial population = 502,000, increasing at a rate of 1.7% per year.

19.) Initial height = 18 cm, growing at a rate of 5.2% per week.

20.) Initial mass = 15 g, decreasing at a rate of 4.6% per day.

21.) The 2000 population of Jacksonville, Florida was 736,000 and was increasing at the rate of 1.49% each year. At that rate, when will the population be 1 million?

22.) The 2000 population of Las Vegas, Nevada was 478,000 and is increasing at the rate of 6.28% each year. At that rate, when will the population be 1 million?

23.) The half-life of a certain radioactive substance is 14 days. There are 6.6g present initially.

a.) Express the amount of substance remaining as a function of time t.

b.) When will there be less than 1 g remaining?

24.) The number of students infected with the flu at Springfield High School after t days is modeled by the function $P(t) = \frac{800}{1+49e^{-0.2t}}$.

a.) What was the initial number of infected students?

b.) When will the number of infected students be 200?

c.) The school will close when 300 of the 800-student body are infected. When will the school close?

25.) The population of deer after t years in Cedar State Park is modeled by the function $P(t) = \frac{1001}{1+90e^{-0.2t}}$

a.) What was the initial population of deer?

b.) When will the number of deer be 600?

c.) What is the maximum number of deer possible in the park?