## Page 10

Bacteria Growth

The number of bacteria after t hours is given by  $y = 150 e^{0.521t}$ 

a) What was the initial amount of bacteria present?

b) How many bacteria are present after 4 hours?

c) How many hours will it take until there are 400 bacteria?

.521£



Determine a formula for the exponential function whose values are given

0)		
ζ.	g(x)	(u = a.
-2	-9.0625 V	9-1
-1	-7.25 <b>√</b>	u = -5
)	-5.8	7
1	-4.64	-4.64 = 7
2	-3.7123	-5.8

$$b = .8$$
 $y = -5.8(.8)^{x}$ 

Determine a formula for the exponential function whose points are given

Find the logistic function that satisfies the given conditions

A) Initial Value 6: Max Capacity (Limit to growth) = 30 Passing through (1, 15)

$$y = \frac{M}{1 + Ab^{\times}}$$

$$y = \frac{30}{1 + Ab^{X}}$$

$$6 = 30$$

$$\begin{array}{c|c}
\hline
30 \\
+ Ab^{\times}
\end{array}$$

$$\begin{array}{c|c}
(0,6) \\
6 = \underline{30} \\
|+ Ab^{\circ}
\end{array}$$

$$\begin{array}{c|c}
15 = \underline{30} \\
|+ 4b^{\circ}
\end{array}$$

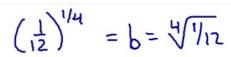
$$6 = \frac{30}{1+A}$$

$$1+4b = \frac{30}{15}$$

$$1+4b = 2$$

$$1+4b = 2$$

$$4b = 1$$



A: Initial Value Max Capacity

$$\beta = \frac{100}{1 + 4\left(\frac{1}{12}\right)^{\frac{1}{4}X}}$$

B) Initial Population = 20, Max Capacity (Limit to growth) = 100 Passing through (4, 75)

$$y = \frac{10.0}{1 + A \cdot b^{2}}$$

$$20 = \frac{100}{1 + A \cdot b^{2}}$$

$$30 = \frac{100}{1 + A \cdot b^{2}}$$

$$1 + 4b^{4} = \frac{100}{75}$$

32. Exponential Growth: The population of River City in the year 1910 was 4200. Assume the population increased at a rate of 2.25% per year.

a) Estimate the population in 1930.

Example 4: Suppose the half-life of a certain radioactive substance is 20 days and there are 5 grams present initially.

- A) Express the amount of the substance remaining as function of time.
- B) Find the time when there will be 1 gram of the substance remaining.

Watauga High School has 1200 students. Bob, Carol, Ted and Alice start a rumor, which spreads logistically so that

 $S(t) = \frac{1200}{1 + 39e^{-0.9t}}$  models the number of students who have heard the rumor by the end of day t.

A) How many students have heard the rumor y the end of Day 0.

$$5(6) = \frac{1200}{1+39}e^{-9(6)} = \frac{1200}{1+39} = \frac{1200}{40} = 30$$

B) How long does it take for 1000 students to hear the rumor?

B) How long does it take for 1000 students to hear the rumor?

$$1000 = \frac{1200}{1+39e^{-.94}} = \frac{39e^{-.94} = .2}{39}$$

$$1+39e^{-.94} = \frac{1200}{1000}$$

$$1+39e^{-.94} = 1.2$$

$$-.94 = 1n(.2/39)$$

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Use the data in the table and exponential regression to predict Dallas, TX population in 2015.

1950	434,462	
1960	679,684	
1970	844,401	
1980	904,599	
1990	1,006,877	
2000	1,1888,589	

