Unit 3 (Chapter 3): Exponential, Logistic, & Logarithmic Functions

3.2 Exponential & Logistic Modeling

Target 3F: Model real world situations and use regressions with the use of functions *Review of Prior Concepts*

The population (P) of a city can be represented in an equation $P = 3000e^{kt}$, where $t = 0$ represents the year 1900. In 1850, the population was 1100. Find the value of k and use this value of k to estimate the			
	$P = 3000e^{kt}$ $1100 = 3000e^{kt}$ $\frac{1100}{300} = e^{-50k}$ $-50k$ $\ln\left(\frac{11}{30}\right) = \ln e^{-50k}$	$t=0 \Rightarrow 1900$ $t=-50 \Rightarrow 1850$ K=? then, when $t=1$ pop:	12 → 2012, =?
	$lm(\frac{H}{30}) = - 50k$ $lm(\frac{H}{30}) = k$ -50 $\cdot 020 = k$ $\frac{1}{7}$ Store in calculator	$P = 3000e^{-020t}$ $P(112) = 3000e^{-020(112)}$ $= 28389.206$	
		28389 people in 2012	

More Practice

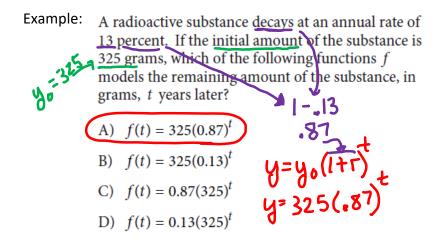
Population Modeling

http://www.coolmath.com/algebra/17-exponentials-logarithms/06-population-exponential-growth-01 http://www.purplemath.com/modules/expoprob2.htm https://www.youtube.com/watch?v=63udRYh04sY



SAT Connection Passport to Advanced Mathematics

1. Create a quadratic or exponential function or equation that models a context.

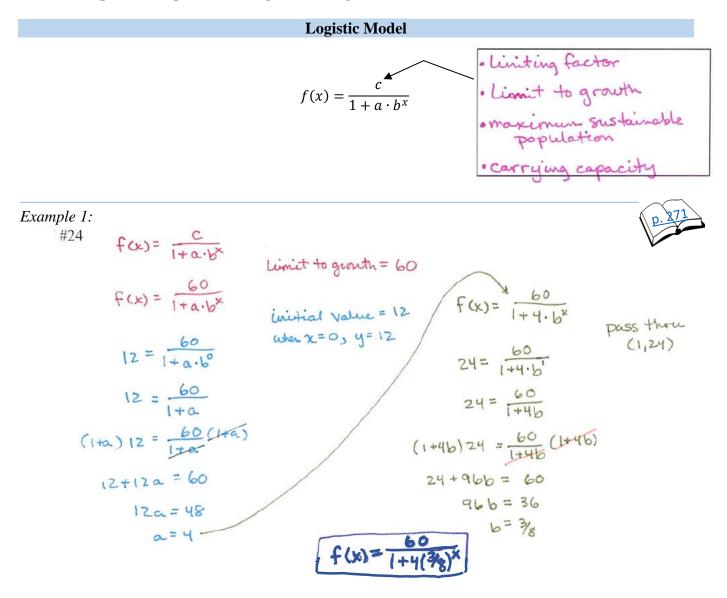


Solution

DATE: _____ Pre-Calculus

Unit 3 (Chapter 3): Exponential, Logistic, & Logarithmic Functions

Pre-Calculus



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Example 2:
p.271 #26

$$f(x) = \frac{c}{1+a\cdot b^{x}}$$
 with the granth = 30
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 $f(x) = \frac{30}{1+5\cdot b^{3}}$ for $f(x) = \frac{30}{1+5\cdot b^{3}$

Example 3: p.272 #46

a) initial population =? t = 0 $P(0) = \frac{1001}{1+90e^{-200}}$ $= \frac{1001}{1+90e^{0}}$ (e²=1) $= \frac{1001}{1+90}$ $= \frac{1001}{1+90}$ $= \frac{1001}{1+90}$ $= \frac{1001}{1+90}$

c) maximum # of deer (maximum sustainable population) [1001 deer]

b) # of deer = 600

$$600 = \frac{1001}{1+90e^{-.2t}}$$

 $(1+90e^{-.2t}) 600 = \frac{1001}{1+90e^{-.2t}} (1+90e^{-.2t})$
 $600 + 54000e^{-.2t} = 1001$
 $54000e^{-.2t} = 401$
 $e^{-.2t} = \frac{401}{54000}$
 $lne^{-.2t} = ln(\frac{401}{54000})$
 $-.2t = ln(\frac{401}{54000})$
 $t = ln(\frac{401}{54000})$
 $t = 24.514$
 24.514 years

More Practice Logistic Models http://www.ck12.org/book/CK-12-Precalculus-Concepts/section/3.7/ https://www.youtube.com/watch?v=LyJrUtzKtwI https://www.youtube.com/watch?v=OSMPeY354cU

Homework Assignment p.271 #23,28,45,47,50

SAT Connection Solution

Choice A is correct. Each year, the amount of the radioactive substance is reduced by 13 percent from the prior year's amount; that is, each year, 87 percent of the previous year's amount remains. Since the initial amount of the radioactive substance was 325 grams, after 1 year, 325(0.87) grams remains; after 2 years $325(0.87)(0.87) = 325(0.87)^2$ grams remains; and after *t* years, $325(0.87)^t$ grams remains. Therefore, the function $f(t) = 325(0.87)^t$ models the remaining amount of the substance, in grams, after *t* years.

Choice B is incorrect and may result from confusing the amount of the substance remaining with the decay rate. Choices C and D are incorrect and may result from confusing the original amount of the substance and the decay rate.