

6.1 Exponential Regression DAY TWO CYU

Use when you get it right all by yourself
S Use when you did it all by yourself, but made a silly mistake
H Use when you could do it alone with a little help from teacher or peer
G Use when you completed the problem in a group
X Use when a question was attempted but wrong (get help)
N Use when a question was not even attempted

CONCEPTS	BASIC	INTERMEDIATE	ADVANCED
Real World Application	1 - 4		
Exponential growth vs decay	1 - 4		
Prediction		1 - 4	
Creating exponential regression	1 - 4		
Growth or Decay Rate		5 - 10	

1. **MODELING WITH MATHEMATICS** The value of a mountain bike y (in dollars) can be approximated by the model $y = 200(0.75)^t$, where t is the number of years since the bike was new.

- a) Tell whether the model represents exponential growth or decay. *$0 < b < 1$ @ 0.75 so... decay*
- b) Identify the annual percent increase or decrease in the value of the bike. *$0.75 = 1 - 0.25$ $r = 0.25$ 25%*
- c) Estimate when the value of the bike will be \$50. *$t = 4.8$*

2. **MODELING WITH MATHEMATICS** The population P (in thousands) of Austin, Texas, during a recent decade can be approximated by $y = 494.29(1.03)^t$, where t is the number of years since the beginning of the decade.

- a) Tell whether the model represents exponential growth or decay. *$b > 1$ @ 1.03 so... growth*
- b) Identify the annual percent increase or decrease in population. *$1.03 = 1 + 0.03$ $r = 0.03$ or 3%*
- c) Estimate when the population was about 590,000. *$t = 6$*

3. **MODELING WITH MATHEMATICS** In 2006, there were approximately 233 million cell phone subscribers in the United States. During the next 4 years, the number of cell phone subscribers increased by about 6% each year.

- a) Write an exponential growth model giving the number of cell phone subscribers y (in millions) t years after 2006. Estimate the number of cell phone subscribers in 2008. *$y = 233(1.06)^t$*
- b) Estimate the year when the number of cell phone subscribers was about 278 million. *$t = 2$ $y \approx 261.8$ million*
2009

4. **MODELING WITH MATHEMATICS** You take a 325 milligram dosage of ibuprofen. During each subsequent hour, the amount of medication in your bloodstream decreases by about 29% each hour.

a) Write an exponential decay model giving the amount y (in milligrams) of ibuprofen in your bloodstream t hours after the initial dose.

$$y = 325 (0.71)^t$$

b) Estimate how long it takes for you to have 100 milligrams of ibuprofen in your bloodstream.

$$\approx 3.4h$$

See Example 4 in book Pg. 299

Rewrite the function in the form $y = a(1 \pm r)^t$. Then state the growth or decay rate.

5. $y = a(2)^{\frac{t}{3}}$

$$y = a(1+0.26)^t$$

26% growth

6. $y = a(4)^{\frac{t}{6}}$

$$y = a(1+0.26)^t$$

26% growth

7. $y = a(0.5)^{\frac{t}{12}}$

$$y = a(1-0.06)^t$$

6% decay

8. $y = a(0.25)^{\frac{t}{9}}$

$$y = a(1-0.14)^t$$

14% decay

9. $y = a\left(\frac{2}{3}\right)^{\frac{t}{10}}$

$$y = a(1-0.04)^t$$

4% decay

10. $y = \frac{5^{22}}{4}^{\frac{t}{4}}$

$$y = a(1+0.01)^t$$

1% growth

CYU Reflection: How far can you go: basic, intermediate, or advanced?

Rate your mastery level!

How confident are you with the skills this CYU covered? Circle the score you would give yourself.

