

Modified Growth Curve Worksheet

Names _____

page 1 of 1

I. Exponential rumor problem - a modified growth curve:

A. How fast a rumor spreads can be calculated by the formula: $y = \frac{P}{1 + (P - n) * e^{-0.4t}}$

(Note: The 1 and the -0.4 in the denominator are constants that never get changed.)

y: total number having heard the rumor

P: number of people that are possible to hear or start the rumor

n: number of people who start the rumor

t: time in minutes

- 1) In a school of 2400 students one student starts a rumor that no one has to take a final exam second semester .

Given the time below, calculate how many students will have heard the rumor:

(round down to the nearest person).

- a) t = 15 minutes

1a) 345

Note: Enter on the graphing calculator on the home screen:

$2400 / (1 + (2400 - 1)e^{(-0.4*15)})$ then press [ENTER]

- b) t = 35 minutes Hint: Press [2nd] [ENTER] to recall the previous formula.

b) 2395

- 2) In the same school 100 students start a rumor that due to a computer error left over from Y2K everyone will get straight A's on their report cards.

Given the time below, calculate how many students will have heard the rumor:

(round down to the nearest person).

- a) t = 15 minutes

2a) 358

- b) t = 35 minutes

b) 2395

- 3) Compare the results of #1b) and #2b) and answer the following

- a) Did the comparisons surprise you (yes or no)?

3a) _____

- b) Explain why using complete sentence(s): _____

- B) Graph the equation from A) above by doing the following then answer the questions below:

a) Press [MODE] and be sure the settings are all highlighted on the left hand side, then

b) Press [Y=] and [CLEAR] out all equations, then make sure the cursor is after the $Y_1 =$

c) Press [2nd] [ENTER] and the formula from above should now be in $Y_1 =$ * Important: Move the cursor over and change the last number (the time - probably 35) to X and make sure the number being subtracted from 2400 is 100.

d) Press [WINDOW] and use the following settings for TI82 and TI83 calculators:

X[0 , 58.75] , Xscl: 50 ; Y[-400 , 2800] , Yscl: 500

e) Press [GRAPH]

- 1) Press [TRACE] and move the cursor using the arrows until X = 15

- a) What is the Y value? (round down to the nearest person)

1a) 358

- b) How does this answer in a) compare to #2a) above?

b) same

- 2) Press [TRACE] and move the cursor using the arrows until X = 35

- a) What is the Y value? (round down to the nearest person)

2a) 2395

- b) How does this answer in a) compare to #2b) above?

b) same

- C) Comparing graphs with n = 1 and n = 100

a) Press [Y=] and make sure the cursor is after the $Y_2 =$

c) Press [2nd] [ENTER] and the formula from above should now be in $Y_2 =$ * Important: Move the cursor over and change the last number (the time - probably 35) to X and make sure the number being subtracted from 2400 is 1.

d) Make sure both Y_1 and Y_2 are highlighted then [GRAPH]

- 1) Both graphs for 1 person and 100 people starting the rumor have been graphed. How do the graphs compare?

1) basically the same

- 2) [TRACE] and move the cursor to X = 15. Compare the Y values of the two graphs by pressing the up arrow key. Also try: [ZOOM] 2. Zoom in at least twice. Are the graphs exactly the same (yes or no)?

2) no