Dr. Katiraie Section 3.1 Notes for Lines and Linear Growth: What does a constant rate mean?

Key concept: A function is called ________ if it has a __________ growth rate

You take notes and put in your own words.

What is positive growth rate? What is negative growth rate?

Example 3.1 In each a function is described. Find the growth rate of the function and give its practical meaning. Make a graph of the function. Is the function linear?

a. For my daughter's wedding reception, I pay $500 rent for the buildings plus $15 for each guest. This describes the total cost of the reception as a function of the number of guest.

b. My salary is initially $30,000, and I get a 10% salary raise each year for several years. This describes my salary as a function of time.

Now try the following problem:

3.1 One of the following is a linear function, and one is not. In each case, determine the practical meaning of the growth rate, and then determine whether or not the given function is linear.

a. One inch is the same as 2.54 cm. Consider distance in cm to be a function of distance in inches.

Formula y = x + **y = mx + b**

What does it mean?

b. Consider the area of a square to be a function of the length of a side.

Example 3.2 Let L denote the length in meters of the winning long jump in the early years of the modern Olympic Games. We think of L as a function of the number n of Olympic Games since 1990. An approximate linear formula is L = 0.14n + 7.20. Identify the initial value and growth rate, and explain in practical terms their meaning.

Now you try the following:
3.2 Let H denote the height in meters of the winning pole vault in the early years of the modern Olympic Games. We think of H as a function of the number n of Olympic Games since 1900. An approximate linear formula is H = 0.20n + 3.3 Identify the initial value and growth rate, and explain in practical terms the meaning of each.

Example 3.3-Arocket starting from an orbit 30, 000 kilometers above the surface of Earth blasts off and flies at a constant speed of 1000 kilometers per hour away from the Earth. Explain why the function fiving the rocket's distance from Earth in terms of time is linear. Identify the initial value and growth rate, and find a linear formula for the distance.

Guess the formula even though it might be wrong.

Now, you try the following Ex 3.3
3.3 Suppose that a stellar object is first detected at 1, 000, 000 kilometers from Earth and that it is traveling toward Earth at a speed of 2000 Kilometers per hour. Explain why the function giving the object's distance from the Earth in terms of time in linear. Identify the initial value and growth rate, and find a linear formula for distance.

Finding and interpreting the slope

Slope = growth rate =

m = slope = growth rate =

Example-Suppose we find snow is falling at a steady rate which means the depth of the snow on the ground is a linear function of the time since it started snowing. At some time during the snow fall, we find the snow is 8 inches deep. Four hours later we find that we now have 20 inches deep. What is the rate of snow?

I like to put m data in point from (,) (,)

Then, I use this to figure out the slope remember the slope formula
(x_1, y_1) (x_2, y_2) where m = ———

so m =

There are two ways to obtain the linear formula

a) by hand
b) by ___________

Example_ Temperature conversion between Celsius and Fahrenheit. The temperature in degrees F is a linear function of the temperature in degrees C.

Freezing water at degrees C Which is Degrees F
Boiling temperature of water degrees C which is F

1. Find the slope
2. Find the formula
3. Graph it

By Hand

1. Find the slope

2. Find the formula by finding out b

3. *Now use calculator to look at line*

Step1
Step 2
Step 3
Step 4

Key concept-Given a set of data points, the ____________ line or ________ line is a line that comes as close as possible to fitting those data.

Put the following date in calculator. Write down the steps to obtain the line on your calculator
1.
2.
3.
4.
Plug into y so you can see the data and line together
Question: How can we find the speed of a 20 inch animal?

Animal	Length (inches)	Speed (feet per second)
Deer mouse	3.5	8.2
Chipmunk	6.3	15.7
Desert crested lizard	9.4	24.0
Grey squirrel	9.8	24.9
Red fox	24.0	65.6
Cheetah	47.0	95.1

Now, you try the following:
3.4: Scientists believe that thousands of years ago the depth of ice in a glacier was increasing at a constant rate, so the depth in feet was a linear function of time in years. Using a core sample, they measured a depth of 25 feet at one time and a depth of 28 feet five years later. What is the slope of the linear function? Explain in practical terms the meaning of the slope?