Pg. 12 Ex. Determine the quadratic function whose vertex is (-3, 13) and whose y-int is -5

4.1 Linear and Quadratic Functions

Modeling with a Linear Function

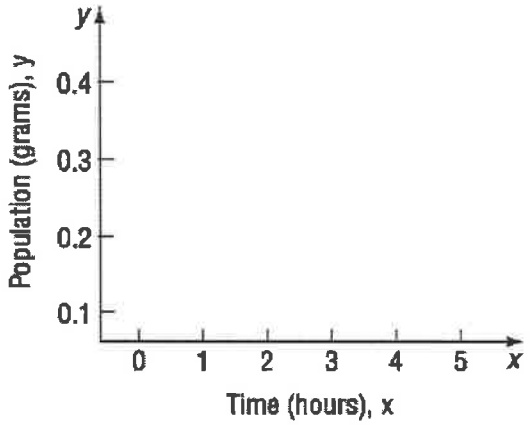
If the average rate of change of a function is a constant m, a linear function f can be used to model the relation between the two variables as follows:

$$f(x) = mx + b$$

where b is the value of f at 0, that is, $b = f(0)$. $\frac{\Delta y}{\Delta x} = m$

Ex. 2a) Use the data shown in the table to determine if the data set has a linear relationship. If it does, determine the equation.

Time (hours)	Population (grams)	(x,y)	Avg. Rate of Change
0	0.09		
1	0.12		
2	0.16		
3	0.22		
4	0.29		
5	0.39		

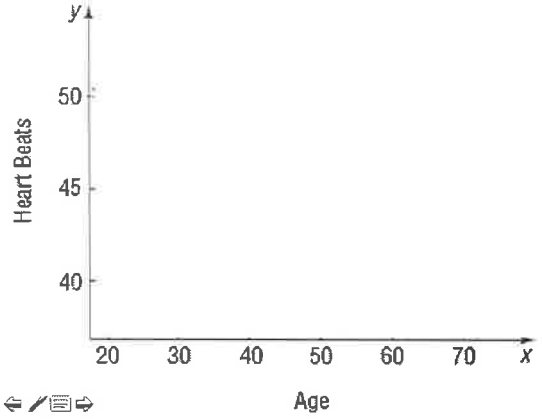


Since the average rate of change is _____,

the function is _____

Pg. 2 Ex. 2b) Use the data shown in the table to determine if the data set has a linear relationship. If it does, determine the equation.

Age	Max Heartbeats	(x, y)	Avg. Rate of Change
20	50		
30	47.5		
40	45		
50	42.5		
60	40		
70	37.5		



Since the average rate of change is _____,

the function is _____

On a linear function, what determines if it's Increasing, Decreasing, or Constant?

The Linear Function is
- $Increasing \quad if \quad \frac{\Delta y}{\Delta x} = m$
- $Decreasing \quad if \quad \frac{\Delta y}{\Delta x} = m$
- $Constant \quad if \quad \frac{\Delta y}{\Delta x} = m$

Pg. 11 Ex. Get into Standard form. Graph. Find all of the important characteristics (y-int, x-int, vertex, axis of symmetry, opens up or down, intervals of increasing/decreasing, domain, range)

$$f(x) = 2x^2 - 12x + 5$$

Pg. 10 Pg. 289 Revenue Example R =

R(p) =

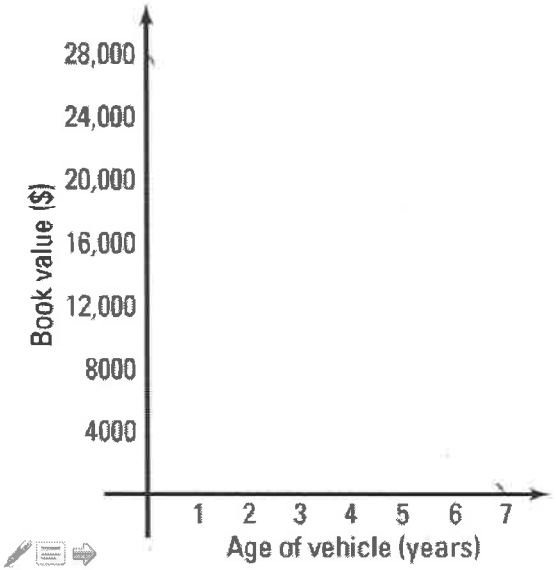
What is the domain for this particular example? How did you figure it out?

How can we find the maximum revenue? What is the maximum revenue?

Look at the graph on page 289, does that match your maximum revenue calculation?

Pg. 3 Ex. 4 Straight Line depreciation is a method used by companies to evaluate current values of high-cost items for their company. The amount of the decline depends on the useful life that company places on the item. A company just purchased a fleet of new cars for $28,000 per car. They expect the car to last for 7 years. Therefore the straight-line depreciation for this car is: _____.

A) Write a linear function that expresses the value of each car as a function of it's age, x.
B) Graph the function
C) What is the value of the car after 3 years?
D) Interpret the slope.
E) When will the value of the car be $8,000?



Ex. 5 Supply and Demand: We aren't going to do this one. But, you may need to know what Equilibrium Price and Equilibrium Demand are and how to find them.

4.3 Quadratic Functions & Properties

What is the general form for a quadratic function? (aka a parabola)

How do you find the maximum or minimum of a quadratic function?

How do we take a quadratic function in general form and change it into standard form?

What is an axis of symmetry and how do we find it?

How can we find the x-intercepts of any quadratic function?

Pg. 8

What is a **Correlation Coefficient**?

What is your Correlation Coefficient for the example problem?

What kind of correlation coefficient do you hope to have for your line of best fit?

Pg. 5 **4.2 Linear Models: Building Functions**

Ex. 1 In baseball, the on-base percentage for a team represents the percentage of time that the players safely reach base. The data given is for the National League during the 2008 baseball season.

Team	On-Base Percentage	Runs Scored
Braves (Yay ☺)	34.5	753
Cardinals	35	779
Rockies	33.6	747
Astros	32.3	712
Phillies	33.2	799
Giants	32.1	640
Pirates	32.0	735
Marlins	32.6	770
Cubs	35.4	855
Diamondbacks	32.7	720
Brewers	32.5	750
Nationals	32.3	641
Reds	32.1	704
Padres	31.7	637
Mets	34.0	799
Dodgers	33.3	700

A) Draw a scatter diagram of the data, treating on-base percentage as the independent variable.
B) Use your graphing utility to draw a scatter diagram
C) Describe what happens to runs scored as the on-base percentage increases.
D) Do you think this relationship is linear?

E) Select two points from your data and find an equation of the line containing the points.
F) Graph that line on your scatter diagram (both on paper and in your calculator.

What is a "Line of Best Fit"?

G) Use your graphing utility to find the line of best fit for the data.
H) Graph that line of best fit on your scatter plots (both on paper and in the calculator)
I) Interpret the slope
J) Use the Line of Best Fit to predict the number of runs a team will score if their on-base percentage is 34.1