

Week in Review # 1
Section 1.1, 1.2, and Focus on Modeling

1. Let $f(x) = 4x^2 - 49$

(a) $f(5) = 4(5)^2 - 49 = 51$

(b) What values of x give y a value of 15?

$$f(x) = 15$$

$$15 = 4x^2 - 49$$

$$64 = 4x^2$$

$$16 = x^2$$

$$\begin{array}{l} x = 4 \\ x = -4 \end{array}$$

(c) what is the horizontal intercepts and the vertical intercept?

↳ x -intercept

plug in 0 for y

$$0 = 4x^2 - 49$$

$$49 = 4x^2$$

$$12.25 = x^2$$

$$x = \pm 3.5$$

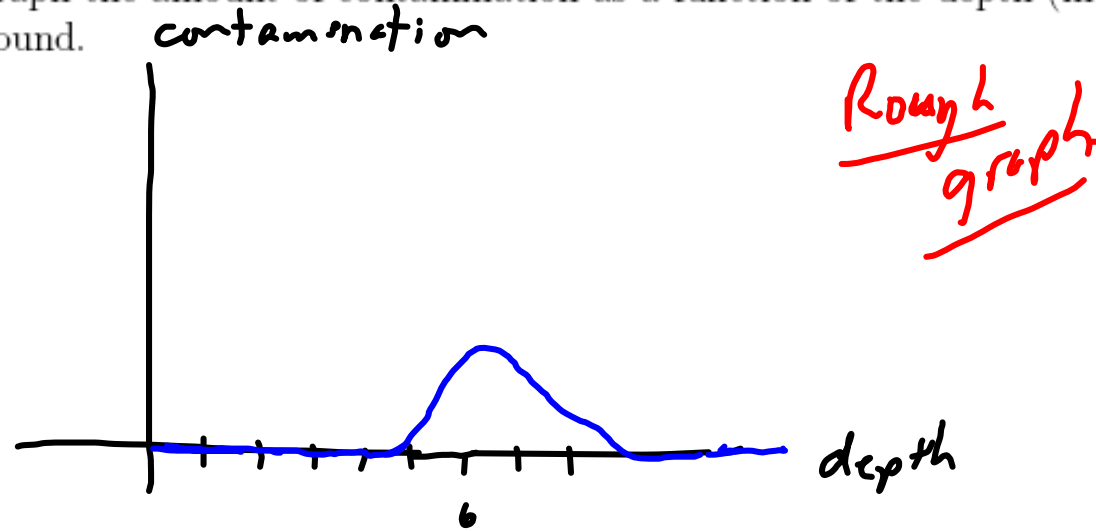
↳ y -intercept.

plug in 0 for x

$$\text{vert.} = -49$$

$$(0, -49)$$

2. A gas tank 6 meters underground springs a leak. Gas seeps out and contaminates the soil around it. Graph the amount of contamination as a function of the depth (in meters) below the ground.



3. In a mountain range, the number, N , of species of birds is a function of the elevation, H , in feet above sea level.

N depends on the height, H

- (a) Which function notation is correct for the given information?

$$\textcircled{N = f(H)} \qquad H = f(N)$$

- (b) Interpret the statement $f(1500) = 30$ in terms of bird species.

*basically
the x-var*

*at a height of 1,500 ft there are 30
species of birds*

4. Find the equation of the line that passes through the points $(-5, 10)$ and $(13, 55)$ in both point-slope form and slope-intercept form.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{55 - 10}{13 - (-5)} = \frac{45}{18} = 2.5$$

point slope: $y - y_1 = m(x - x_1)$

$$y - 10 = 2.5(x - (-5))$$

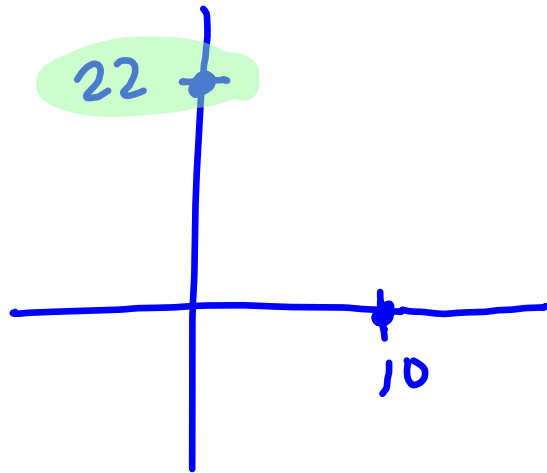
$$y - 10 = 2.5(x + 5)$$

slope intercept: $y = mx + b$

$$y - 10 = 2.5x + 12.5$$

$$y = 2.5x + 22.5$$

5. Find the equation of the line with a horizontal intercept of 10 and a vertical intercept of 22.



$$\underline{(10, 0)}$$

$$\underline{(0, 22)}$$

$$m = \frac{22 - 0}{0 - 10} = -2.2$$

Slope intercept $y = mx + b$

$$y = -2.2x + 22$$

6. For the line $5y + 8x + J = 0$, where J is some number, answer the following.

(a) slope = $-\frac{8}{5} = -1.6$ \rightarrow $5y = -8x - J$
 $y = -\frac{8}{5}x - \frac{J}{5}$

(b) vertical intercept = $-\frac{J}{5}$

(c) horizontal intercept = $\rightarrow -\frac{J}{8}$
 $5y + 8x = -J$
 \uparrow $8x = -J$ $x = -\frac{J}{8}$

(d) Find the change in y when x is increased by 2.

$m = \frac{-1.6}{1}$

slope = $\frac{\text{rise}}{\text{run}} = \frac{a}{b}$

increase x by b means increase y by a

increase x by 2 means y drops by $2(1.6)$
or 3.2

7. The value of a truck in thousands, V , is a function of the age of the truck in years, a .

(a) Interpret the statement $f(5) = 14$.

$$f(\text{age}) = \text{value}$$

A 5 year old truck has a value of \$14,000

(b) The value of Chevy Truck is approximated by $f(a) = 31.45 - .75a$. Interpret the slope and the vertical intercept of the function.

vert. int. is 31.45

A Brand new chevy truck (ie age 0) is worth
\$31,450

slope is $-.75$

for each year older the
truck gets its value
goes down by \$750.
(ie. .75 thousand dollars)

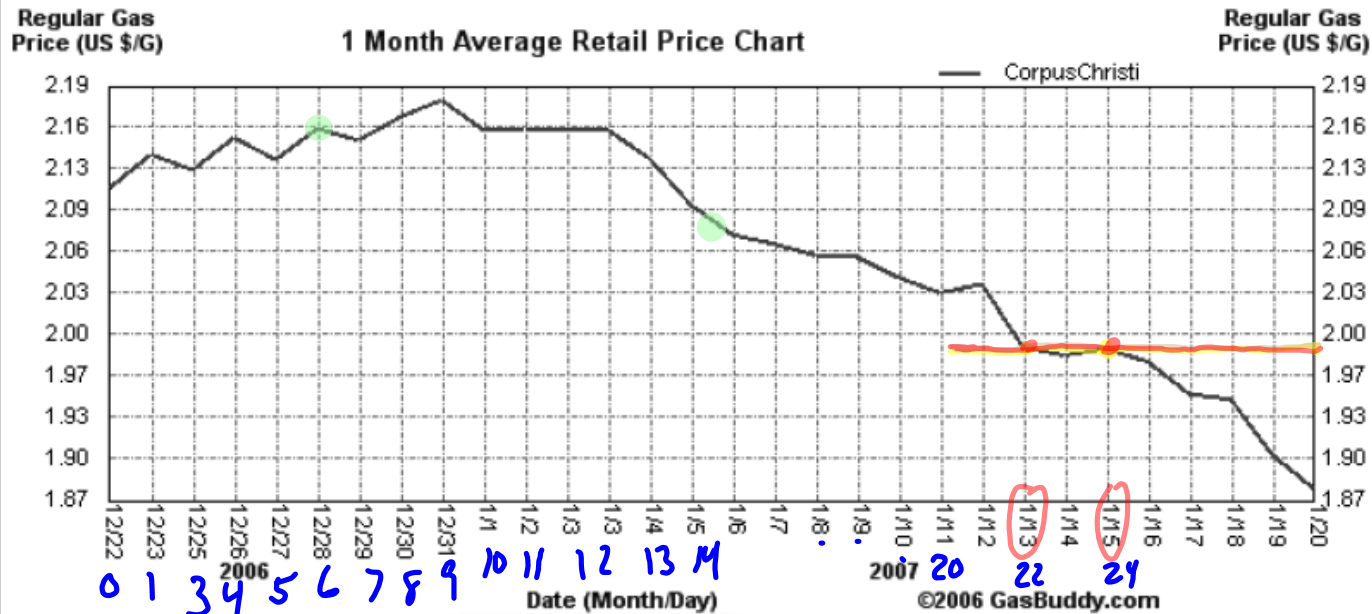
Basic idea

$$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x}$$

for this prob.

$$m = \frac{\Delta \text{value}}{\Delta \text{age}}$$

8. The following graph shows the daily average retail price of regular gasoline in the Corpus Christi area. If the retail price, p , is a function of the number of days, t , since December 22 (i.e. $t = 1$ represents December 23, $t = 5$ represents December 27), then $p = f(t)$.



- (a) What is the value of p when t is 6? # 2.16
- (b) What is $f(14)$? # 2.09
- (c) For what value(s) of t is the price \$1.99? Interpret the meaning of these values of t .

$$t = 22 \rightarrow \text{Jan 13}$$

$$t = 24 \rightarrow \text{Jan 15}$$

9. Find the best fitting line linear regression, for the data.

L₁

x	0	6	10	12	15	18
y	63	45	27	17	10	0

L₂

least squares regression

↓
Linear regression

Step 1 put data in the calc.

Stat enter

Step 2 if you want a scatter plot

only
do
once

press 2nd y= to set up system
set plot 1 to on
first pic in Row 1 of type
X List: L₁
Y List: L₂

Turn scatter plot on + off by y= menu

Zoom Stat to graph

Step 2 if you just want regression line

Stat → calc Choice 4

answer

$$y = -3.6057x + 63.6584$$

10. A sample of nine adult men gave the following data on their heights and weights.

L ₁	Height(inches)	63	66	67	68	68	70	70	72	76	← x act
L ₂	Weight(pounds)	140	145	185	180	165	195	215	220	240	← y as

(a) For the data, find the linear regression equation where weight is a function of height.

$$y = 8.5421x - 401.2325$$

$$W = 8.5421h - 401.2325$$

(b) Interpret the significance of the slope.

$$\frac{\Delta y}{\Delta x} \quad \frac{\text{pounds}}{\text{inches}} \quad 8.5421 \text{ lbs/inch}$$

for each inch taller, the weight goes up by 8.5421 lbs

(c) Using the regression equation, predict the weight of a man that is 67 inches tall.

plug in 67 for x solve for y.

$$y = 171.0882 \text{ lbs}$$

(d) Using the regression equation, predict the height of a guy that weighs 235 pounds.

plug in 235 for y solve for x

$$235 = 8.5421x - 401.2325$$

$$636.2325 = 8.5421x$$

$$x = 74.4820 \text{ inches}$$