Sec 1.3 Linear Functions

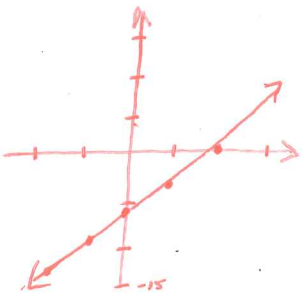
Linear Function – f(x) = mx + b where f(x) is a line with slope m and y-intercept b

To Graph:

a. Use slope and intercept (constant rate of change and vertical intercept)
b. Make a table of values

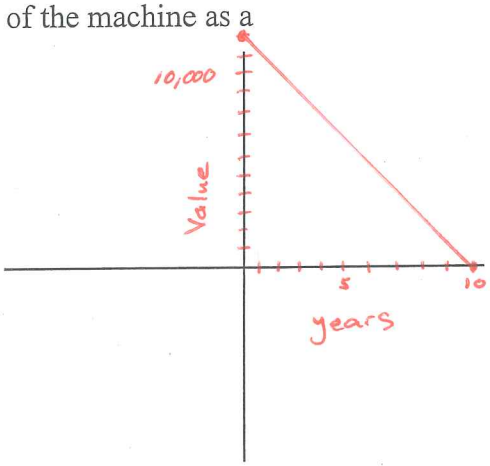
Ex. Graph the equation f(x) = 3x – 6 using both methods and using your graphing calculator.

x	f(x)	
-2	3(-2) - 6	-12
-1	3(-1) - 6	-9
0	3(0) - 6	-6
1	3(1) - 6	-3
2	3(2) - 6	0



Ex. Suppose that a company has just purchased a new machine for its manufacturing facility for $120,000. The company chooses to depreciate the machine using the straight line method over 10 years.

A. Write a linear function that expressed the book value of the machine as a function of its age.
B. Graph the linear function.
C. What is the book value of the machine after 4 years?



$V = 120{,}000 - 12{,}000t$

$120{,}000 - 12{,}000(4)$

$120{,}000 - 48{,}000$

$V = \$72{,}000$

Scatter Diagram – scatter plot of independent variable vs dependent (x, y)

Curve Fitting – Linear vs. non-linear

- Linear must be able to draw a straight line through the data that touches almost all point[s] or is close to almost all points. Non-linear data cannot have a straight line drawn through the data.

Ex. a.

positive correlation

b.

negative correlation

c.

No correlation

Line of Best Fit – a line that can be drawn through or close to most of the points on the graph

Correlation Co-efficient: between –1 and 1 shows how strongly related the data is, the closer to either –1 or 1, the better related the data are

To Find Line of Best Fit and Correlation Co-efficient (r):

a. Enter your data into Stat
b. Go to Catalog and turn Diagnostics ON
c. Turn your stat plot on and graph as a scatter plot
d. Stat – Calc – Linear Reg and hit enter
e. Enter equation into y = (remember that a = m and use y = mx + b
f. Graph

Ex. Given

x	3	4	5	6	7	8	9
y	4	6	7	10	12	14	16

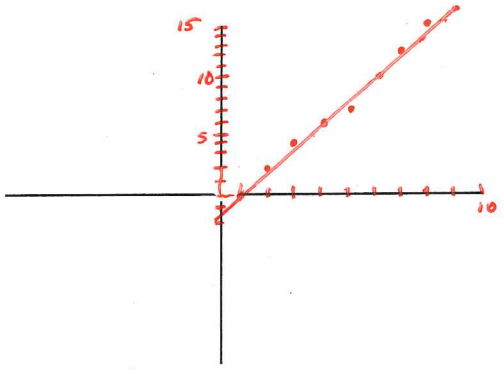
$\frac{16-4}{9-3} = \frac{12}{6} = 2$

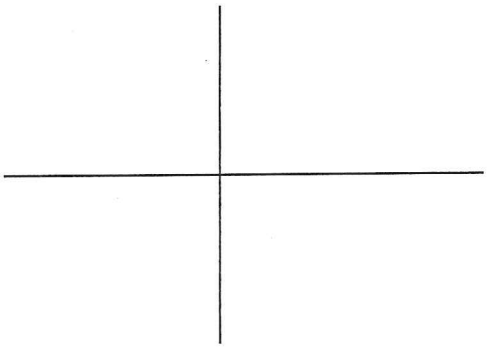
$y = y_1 + m(x - x_1)$
$y = 4 + 2(x - 3)$
$y = 4 + 2x - 6$
$y = 2x - 2$

$4 = 2(3) + b$
$4 = 6 + b$
$-2 = b$
$y = 2x - 2$

a. Draw a scatter diagram.
b. Find the equation containing two points of the diagram.
c. Graph the line found in b on the scatter diagram.
d. Use a graphing calculator to find a line of best fit. $y = 2.04x - 2.36$
e. Use a graphing calculator to graph the line of best fit on the scatter diagram.

$y = 16 + 2(x - 9)$
$y = 16 + 2x - 18$
$y = 2x - 2$





Ex. The cost C of chocolate covered almonds varies directly with the number A of pounds of almonds purchased. If the cost is $23.75 when the number of pounds of chocolate covered almonds purchased is 5, find a linear function that relates the cost C to the number A of pounds of almonds purchased. Then find the cost C when the number of pounds of almonds purchased is 3.5.

$y = kx$
$C = kA$
$23.75 = k5$
$4.75 = k$

$C = 4.75A$

$C = f(A) = 4.75A$
$f(3.5) = 4.75(3.5)$
$f(3.5) = \$16.63$

Ex. A town of 30,000 people grows by 2000 people every year. What is the average rate of change of P (the population)? Make a table that gives the town's population every five years over a 20 year period and then graph it. Find a formula for P as a function of t.

RATE OF CHANGE = 2000 people/yr

t	P
0	30,000
5	40,000
10	50,000
15	60,000
20	70,000

$P = f(t) = 30{,}000 + 2000t$

HW: pg 25-27 # 2-4, 7, 9-12, 14, 17, 20, 21, 24, 27, 28, 29, 32, 34