

## Chapter 12 Exercise Set A

1a  $\text{Income} = \$2,000(8) + \$5,000 = \$21,000$

1b  $\text{Income} = \$2,000(12) + \$5,000 = \$29,000$

1c  $\text{Income} = \$2,000(16) + \$5,000 = \$37,000$

2a 0 nitrogen  $\Rightarrow$  240 oz

2b 1 oz nitrogen gives 20 oz more of rice.

2c rice yield =  $20(3) + 240 = 300$  oz = 18 lbs. 12 oz      16 oz = 1 lb.

rice yield =  $20(4) + 240 = 320$  oz      20 lbs.

2d Controlled Experiment!

2e Yes I would, the correlation coefficient was large and 3 is close to what was studied.

2f No, 100 is too far away from what was studied. This would be extrapolation.

3a ① y is height of son  
x is height of father.

②  $m = \frac{.5 \times 2.7}{2.7} = .5$

③  $b = y - mx = 69 - (.5)(68) = 35$

④ Predicted son's height =  $.5(\text{height of father}) + 35$

3b ① y is father's height  
x is son's height.

②  $m = \frac{.5 \times 2.7}{2.7} = .5$

③  $b = 68 - (.5)(69) = 33.5$

④ Predicted father's height =  $.5(\text{son's height}) + 33.5$

4 False! There is still error involved with regression, so it is not "precise"; also it is not a substitute for experiments. It is a way to discuss data from an experiment.

## Chapter 12 Exercise Set B

1 predicted height =  $.25(12) + 66.75 = 69.75"$   
 $= .25(16) + 66.75 = 70.75"$

No! Association does not equal causation. Men in college are still growing usually.

2 predicted length =  $.05(3) + 439.01 = 439.16$   
 $= .05(5) + 439.01 = 439.26$

Yes, this was done as an experiment so we can prove causation.

3a. SD line!  $y$  is V-SAT

①  $\frac{680 - 560}{120} = 1$

②  $y = 1(110) + 540 = 650$

3b ①  $\frac{560 - 560}{120} = 0$

②  $y = 0(110) + 540 = 540$

3c greater than because the RMS error for the SD line is not the same as for the Regression line, the spread is bigger.

4. It doesn't matter what the M-SAT score is so we are using one variable.

a) 540 (average)

b) 540 (average)

c) 110 greater than  $\sqrt{1-.6^2} \times 110$ , it's the SD.

5. The regression line will have the smallest RMS error.

Take you can take one equation and solve for the other because you are working with TWO DIFFERENT lines completely.

If EVERYONE goes up the SD's are not affected so the slope is the same. The y-intercept will also rise by 10%.

$$\text{wife's income} = (.1667)(\text{husband's income}) + 2640$$

Plug in the point of averages and solve for  $m$ .

$$4 = x(1) + 2 \Rightarrow 4 = (x) + 2 \Rightarrow 2 = 1x \Rightarrow x = 2$$

So the slope is .5

- 8a True, many lines exist through the cloud of points.
- 8b False, the regression line is just one way to analyze data.
- 8c False, all lines have an RMS error.
- 8d True
- 8e True, by definition.
- 9 This is the regression line because for a vertical strip in  $x$  they are finding the average  $y$ . So the slope is:

$$y \text{ is IQ (100)} \\ x \text{ is income} \quad m = \frac{.5(15)}{45,000} = .000167.$$

- 10 It is going to be too high, you need to look at the other regression line to analyze what the question is asking.
- 11 To test the equation, enter the point of averages, the one point this line must pass through.

$$12.7 = .00000925(79300) + 10.3 \\ 12.7 = .733525 + 10.3 \\ 12.7 = 11.033525 \text{ is not true.}$$

There is something wrong with the equation.

- 12 No, since half the data had a positive correlation and half had a negative correlation it makes it seem that Salt and Blood pressure have no relationship, there is no consistent direction.