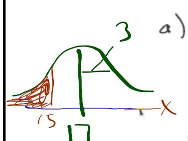
Pick up the Warm Up

and Yellow recording sheet

① The weights of suitcases at an airport are normally distributed with a mean of 17 kg and $\sigma = 3$ kg

a) How many of the 300 suitcases per hour would you expect to be lighter than 15 kg?



$P(x<15) = 0.252...$

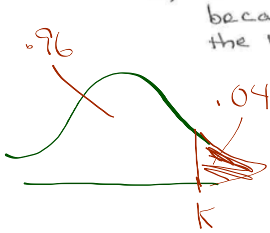
normalcdf(-1000, 15, 17, 3)

$(.252...)(300)$

$= \cancel{75.7 \text{ suitcases}}$

75.7 suitcases

b) 4% of the suitcases on any day are rejected because they exceed the weight limit. What is the weight limit?



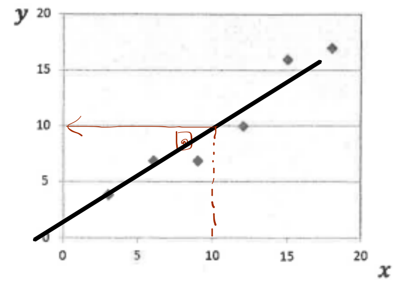
$P(x<k) = .96$

$k = 22.3$ kg

invNorm(.96, 17, 3)

(2)

Consider the graph of variables x versus y shown on the set of axes below:



$(\bar{x}, \bar{y})$

a. Draw a line of best fit on the graph shown above.

b. Circle the correlation coefficient shown below that best illustrates the relationship shown between the two sets of data x and y.

$r \approx 0$ $\quad$ $r \approx -0.96$ $\quad$ $r \approx 0.96$ $\quad$ $r \approx 0.24$

c. Use the li~~ne of best~~ fit drawn in part (a) above to estimate a value of y corresponding to an x value of 10.

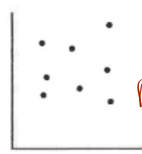
(3)

Match the letter of the appropriate correlation coefficient with the graphs shown below:

Graph 1:

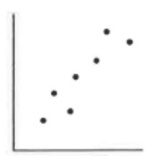
$r = -1$

Graph 2:



$r = 0$

Graph 3:



$r = .7$

A. $r \approx 0$ $\quad$ B. $r \approx +1.0$ $\quad$ C. $r \approx -1.0$ $\quad$ D. $r \approx +0.7$ $\quad$ E. $r \approx -0.7$

(4)

Ten middle years students were measured for height (h) and arm span (a). The results are shown in the table below:

Height: h (cm)	Arm Span: a (cm)
152	154
156	154
160	158
164	166
166	163
166	167
170	172
175	174
177	178
180	178

166.6
167

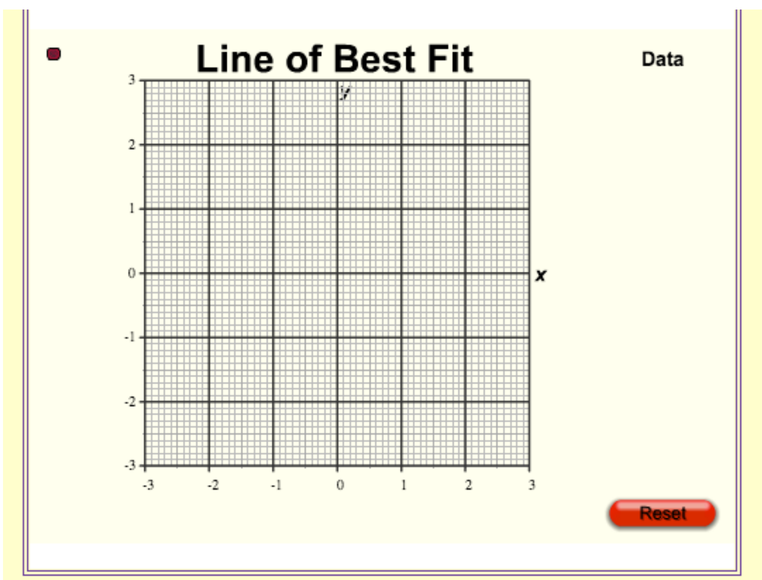
a. Calculate $\bar{h}$ and $\bar{a}$. $\bar{h} = 167$ cm $\bar{a} = 166$ cm

b. Determine the correlation coefficient between h and a. $r = 0.98$

c. Use words to describe the relationship between h and a.

very strong, positive, correlation between height and armspan

as the heights increase, the arm spans increase



Go over HW

Use the given points to find the following: (18, − 6) , (9, 1)

a) Find the slope of the line that goes through the two points.

$$m = \frac{\Delta y}{\Delta x} = \frac{1 - {}^{-}6}{9 - 18} = -\frac{7}{9}$$

POINT-SLOPE

$y - y_1 = m(x - x_1)$

$(18, -6)$

$(9, 1)$

Watch the demo of the linear correlation coefficient adjust as additional data is being added.

http://illuminations.nctm.org/Activity.aspx?id=4186

staff.argyll.epsb.ca/jreed/math9/strand4/scatterPlot.htm

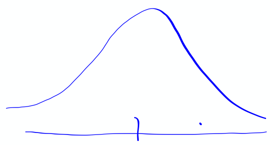
$y = mx + b$

$y - y_1 = m(x - x_1)$

Point-Slope Form

$(5, -3)$ $(2, 7)$

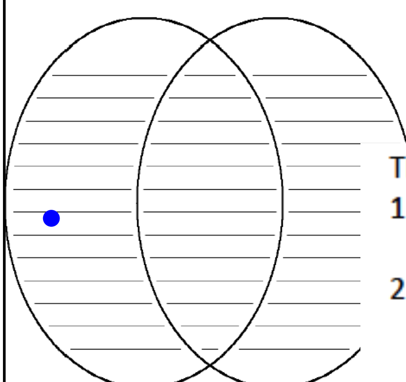
(x_1, y_1)



$y - 6 = \frac{2}{3}(x - 7)$

point slope
$(7, 6)$ $\frac{2}{3}$

Association vs. Causation



Three reasons why two variables may be associated:

1. An experiment proves that one variable causes the other. This is a true causation.
2. A third variable impacts both variables making it appear that there is a cause and effect relationship. This is an association.
3. There is a correlation but it is just coincidental due to a very small sample size. This is an association.

AIM

Calculate the correlation coefficient, "by hand"using the formula itself.

There are a few methods to calculate the correlation coefficient, r. The one we will be looking at was invented by someone called Pearson, and its full title is......

Pearson's Product Moment Correlation Coefficient

will also be in the Ch 11 packet

$\overline{X}$ mean of the independent variable

$\overline{y}$ mean of the dependent variable

$(x_i - \overline{x})^2$ square of the deviation from the mean of the indep. variable

$(y_i - \overline{y})^2$ same, but for depend. variable

$\sum (x_i - \overline{x})^2$

$$r = \frac{\sum (x - \overline{x})(y - \overline{y})}{\sqrt{\sum (x - \overline{x})^2 \sum (y - \overline{y})^2}}$$

$r =$

(will not be on the IB exams, BUT will be needed for the IB project if youuse correlation)

For IB exams:

a) On the IB exam, you would only use your calculator to quickly calculate r

b) If you use correlation on your project, you would have to include a calculation by hand
(with the help of a spreadsheet most likely.
(checked by a calculator, perhaps)

An example

with simple data

Copy down in your notes. Enter the following data in your GDC

Distance from the statue	Price of the Bottle
10 metres	**$2.80**
50 metres	**$2.70**
80 metres	**$2.60**
100 metres	**$2.40**
130 metres	**$2.20**
170 metres	**$2.00**

$\bar{x} = 90$ m

$\bar{y} = 2.45$

$\bar{x} = 90$
$\bar{y} = 2.45$

$$r = \frac{\sum (x-\bar{x})(y-\bar{y})}{\sqrt{\sum (x-\bar{x})^2 \cdot \sum (y-\bar{y})^2}}$$

$$= \frac{(10-90)(2.80-2.45) + (50-90)(2.70-2.45) + \ldots\ldots}{\sqrt{(10-90)^2 + (50-90)^2 + \ldots \times (\ -\ )^2 + (\ -\ )^2 + \ldots}}$$

$\bar{x} = 90$
$\bar{y} = 2.45$

$$r = \frac{\sum (x-\bar{x})(y-\bar{y})}{\sqrt{\sum (x-\bar{x})^2 \cdot \sum (y-\bar{y})^2}}$$

$$= \frac{(\ -\ )(\ -\ ) + (\ -\ )(\ -\ ) + \ldots\ldots}{\sqrt{(\ -\ )^2 + (\ -\ )^2 + \ldots \times (\ -\ )^2 + (\ -\ )^2 + \ldots}}$$

$$r = \frac{-86}{\sqrt{(16{,}200)(.475)}} = -.980$$

$r =$

BB

next two days

Assignment Day #2 is a worksheet

Due tomorrow.

Optional Extra Practice Problems for tomorrow's 15 to 20 minute quiz on Normal Distribution

Answers are posted along with the others. These are not required to be turned in.

p. 312 Review Set A....1, 3, 6 and Set B... 2, 5

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