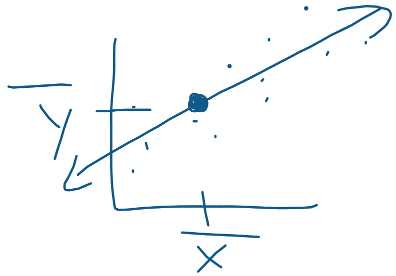
1. Suppose a data set has a linear regression line of y = 6 - 0.8*x*. If the mean of the *x*'s is 5, what is the mean of the *y*'s?

$\bar{x}=5$

> **A.** 2
> **B.** 5
> **C.** 10
> **D.** 6
> **E.** -5

$(\bar{x}, \bar{y})$ always on the LSRL (line)




$\hat{y} = 6 - 0.8(5)$, where $5 = \bar{x}$

$= 6-4$

$\hat{y} = 2$

$(\bar{y} = 2)$

2. If an observed *y*-value is below a line of best fit, then the residual is

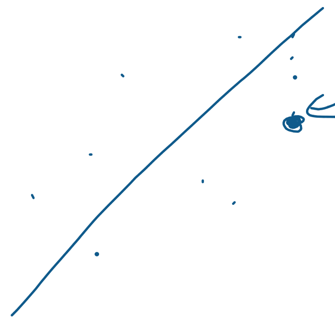
**A.** positive.

**B.** negative.

**C.** equal to the squared residual.

**D.** greater than one.

**E.** None of the above



3. You have the following regression equation for the effect of streetlights per block ($x$), on crimes per month ($y$): $\hat{y} = 2.4 - 0.2x$. How many crimes a month are predicted when there are 7 street lights on a block?

$x$

$\hat{y} = 2.4 - 0.2(7)$
$= 2.4 - 1.4$
$= 1.0$

**A.** 3.8

**B.** 1.7

**C.** 16.6

**D.** -11.6

**E.** 1.0

4. You have the following regression equation for the effect of streetlights per block ($x$), on crimes per month ($y$): $\hat{y} = 2.4 - 0.2x$. Calculate the residual for a block with 10 streetlights and 1 crime a month (10,1).

x y

actual

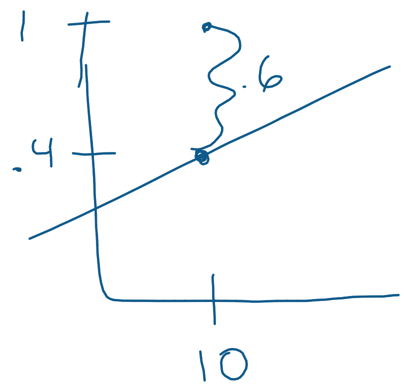
**A.** -0.6

**B.** 0.6

**C.** -0.4

**D.** 0.4

**E.** -1.2




$\hat{y} = 2.4 - 0.2(10)$

$\hat{y} = .4$

predicted

Residual = actual − pred.

$= 1 - .4$

$= .6$

5. Describe the strength and direction of a relationship with the correlation coefficient $r = -0.8$.

.8 – .9 (strong/fairly strong)
.9 + (very strong)

**A.** Moderate and negative

**B.** ~~Weak~~ and negative

**C.** Strong and negative

(I would say fairly strong

**D.** Weak and ~~positive~~

**E.** ~~There is no association~~

6. Which of the following determines the sign of $r$?

**A.** The pattern of the residuals

**B.** The strength of the relationship between variables

**C.** Whether the $y$-intercept, $b_0$, is positive or negative

**D.** Whether the value of $y$ increases or decreases as the value of $x$ increases (slope)

**E.** Whether the sum of the squared residuals is positive or negative

7. A bivariate scatterplot has an $r^2$ of .85. This means:

**A.** 15% of the variation in *y* is explained by the changes in *x*.

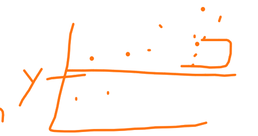
**B.** 15% of the variation in *x* is explained by the changes in *y*.

**C.** 15% of the variation in *x* isn't explained by *y*.

**D.** 85% of the variation in *y* is explained by ~~the changes in *x*.~~ (the LSRL with x)

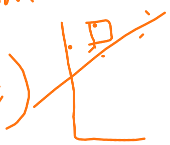
**E.** 85% of the variation in *x* is explained by the changes in *y*.

Sum of squared resids from $\bar{y}$



8. If the least-squares linear regression line explained the same amount of variation as the line $\hat{y} = \bar{y}$, what would be the value of $r^2$?

resid sum of sq. from LSRL



$$r^2 = \frac{SSE(\bar{y}) - SSE(\hat{y})}{SSE(\bar{y})}$$

see 28-1 notes (% decrease)

$$= \frac{475.75 - 235}{475.75}$$

% dec.

**A.** 1.00

**B.** 0.50

**C.** 0

**D.** -1.00

**E.** Can't answer with only this information

if same variation

$SSE(\bar{y}) - SSE(\hat{y}) = 0$

9. A residual:

**A.** is the amount of variation explained by the least-squares regression line of $y$ on $x$.

**B.** is how much an observed $y$-value differs from a predicted $y$-value.

**C.** predicts how well $x$ explains $y$.

**D.** is the total variation of the data points.

**E.** should be smaller than the mean of $y$.

10. A linear regression line indicates the amount of grams of the chemical $CuSO_4$ (the response variable, $y$) that dissolve in water at various temperatures, Celsius (the explanatory variable, $x$). The least-squares regression line is $\hat{y}$ = $\cancel{10.14}$ + 0.51$x$. Give the meaning of the slope of the regression line in the context of the problem.

$\frac{.51}{1} = \frac{y}{x}$ $\frac{CuSO_4 \text{ dissolved}}{\text{temp(C)}}$

~~A.~~ For each one-degree rise in the temperature, you can dissolve ~~10.14~~ more grams of $CuSO_4$.

**B.** If the temperature increases by ~~0.51~~, you can dissolve ~~one~~ more gram of $CuSO_4$.

**C.** When you dissolve ~~one~~ more gram of $CuSO_4$, then the temperature will rise by ~~0.51~~.

**D.** For each one-degree rise in the temperature, you can dissolve 0.51 ~~fewer~~ negative grams of $CuSO_4$.

**E.** For each one-degree rise in the temperature (x), you can dissolve 0.51 more grams of $CuSO_4$ (y). add predicted

11. If you're attempting to predict a value of the response variable using a value of *x* that is outside the range of observed *x*-values in your data set, you're conducting a process of:

**A.** predicting the slope of the regression line.

**B.** interpolation.

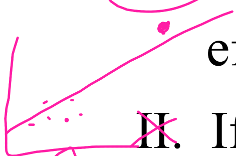
**C.** computing residuals.

**D.** extrapolation.

**E.** slope interpretation.

12. Which of the following statements about influential points is true?

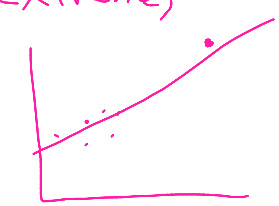
I. Removing an influential point from a data set can have a major effect on the regression line.



~~II.~~ If you calculate the residual between the influential point and a regression line based on the rest of the data, it will probably be large.

(not always)

III. You will typically find an influential point horizontally distant from the rest of the data along the $x$-axis. (large or small x-value) (extreme)



**A.** I only

**B.** II only

**C.** III only

**D.** I and II only

**E.** I and III only

13. An outlier:

**A.** usually does not have a strong effect on the correlation coefficient and regression line. True (doesn't necessarily) False (~~does~~ reduce r)

T **B.** can also be an influential point.

T **C.** may be an error. (check data)

**D.** usually does not have a strong effect on the regression line, can also be an influential point, and may be an error.

**E.** usually has a strong effect on the correlation coefficient and ~~regression line~~ and can also be an influential point. T F T

14. Influential points and outliers:

inf. always does (definition)

~~**A.**~~ sometimes have no effect on the regression line.

~~**B.**~~ are useful when they cause a stronger correlation coefficient for a data set.

~~**C.**~~ should be discarded if they cause a weaker correlation coefficient for a data set. cheating

**D.** are rarely found in data sets.

**E.** should be examined carefully to determine if they're part of the data set.