It is stated that 70% of people like crabs and we take a random sample of 90 people what is the probability that over 75% of the sample says they like crabs?

- Random Sample ✓
- 10n < Pop. Size ✓
- $np \geq 10$ ✓
- $n(1-p) \geq 10$ ✓

$n = 90$ ←

$p = .70$ ← (70%)

$1-p = .3$ ← (30%)

$\hat{p} = .75$

(*) $z = \dfrac{\hat{p} - p}{\sigma_{\hat{p}}}$

(*) $\sigma_{\hat{p}} = \sqrt{\dfrac{p(1-p)}{n}} = \sqrt{\dfrac{.7(.3)}{90}} \approx .0483$

$(.8508) =$

1) Lie detectors are based on measuring changes in the nervous system. The assumption is that lying will be reflected in physiological changes that are not under the voluntary control of the individual. When a person is telling the truth, the galvanic skin response scores have a distribution that is normal with a mean of 51.6 and a standard deviation of 9. (Assume ALL Conditions are met)

$\mu = 51.6 \quad \sigma = 9 \quad n = 10 \quad \bar{x} = 49.5$

What is the probability that a sample of 10 people will have an average score less than 49.5? (6 pts)

$\mu_{\bar{x}} = \mu$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

$\sigma_{\bar{x}} = \frac{9}{\sqrt{10}} \approx 2.85$

$z = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}} = \frac{(49.5 - 51.6)}{2.85} = \frac{-2.1}{2.85}$

$z \approx -.74 \rightarrow .2296$

Symbols

Population		Sample
μ	Mean	$\bar{x}$
σ	S.D	s
p	Proportion	$\hat{p}$
N		n

* Symbols for a Sampling Distribution

$\mu_{\bar{x}} = \mu$	$\mu_{\hat{p}} = p$
$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$	$\sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}}$
Sample means	Sample Proportions
Quantitative	Categorical

An SRS of 240 first-year college students were asked whether they applied for admission to any other college. In fact, it is known that 76% of all first-year students applied to colleges besides the one they are attending. What is the probability that the poll will give a sample proportion between 73% and 77%?

$n = 240$

$p = .76$

$* \hat{p} = .73$ $* \hat{p} = .77$

- Random Samp ✓
- $10n <$ Pop Size ✓
- $np \geq 10$ ✓
- $n(1-p) \geq 10$ ✓

$\mu_{\hat{p}} = p = .76$

$\sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{.76(.24)}{240}} \approx .0276$ .0275 68

$z = \frac{\hat{p} - p}{\sigma_{\hat{p}}} = \frac{.73 - .76}{.0276} = -1.09$ (.1379)

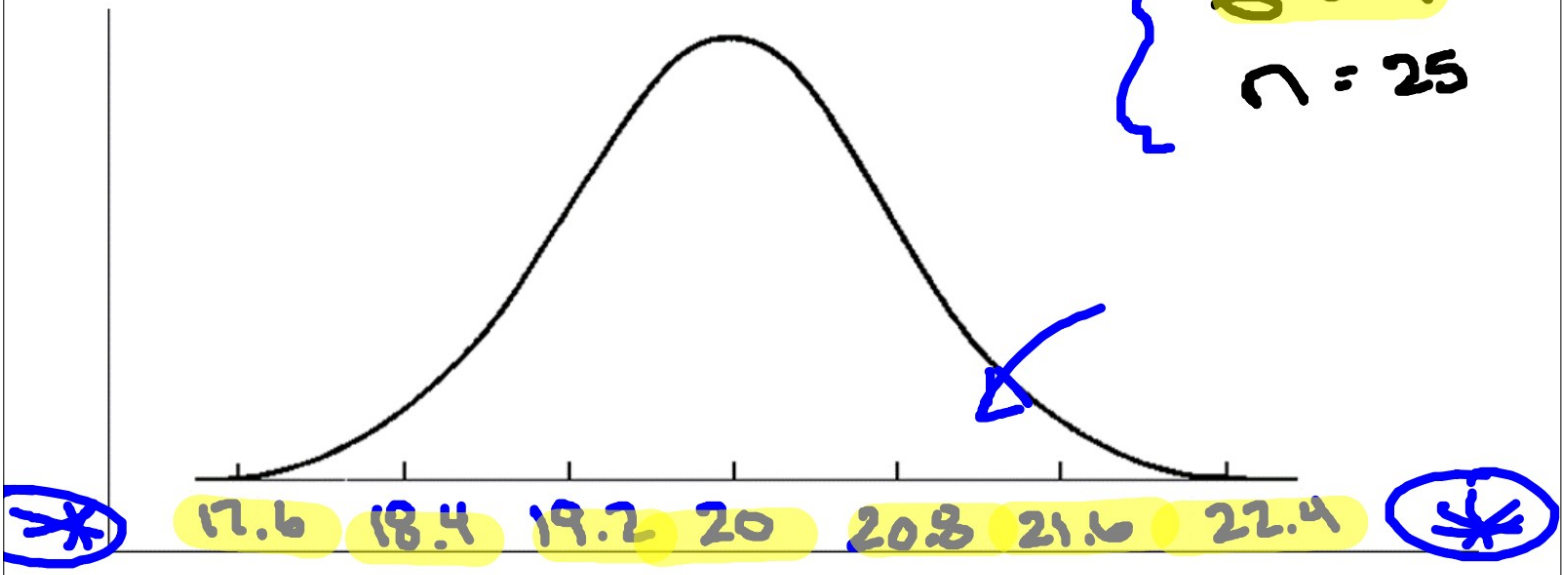
$z = \frac{\hat{p} - p}{\sigma_{\hat{p}}} = \frac{.77 - .76}{.0276} \approx .36$ (.6406)

1) If mean of a population that is normally distributed is 20 and the standard deviation of the population is 4. Sketch the sampling distribution of sample means for a sample size of 25. (4 pts)

$\mu = 20$

$\sigma = 4$

$n = 25$



$\mu_{\bar{x}} = \mu = 20$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{4}{\sqrt{25}} = .8$

Scatter Plots and Least-Squares Lines

You should be able to:

1. Create a Scatter Plot on STAT CRUNCH
2. Find the equation for the Linear Regression Line
3. Understand the strengths of linear correlations
4. Find and understand the meaning of the coefficient of correlation "r-value"
5. Make a prediction for an output value (y-hat) given a specific x-value.

Vocabulary

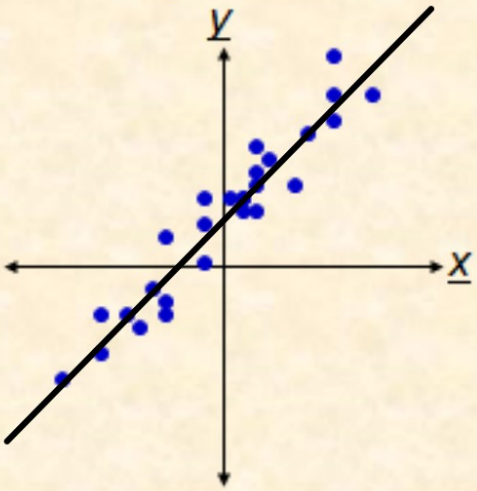
- Scatterplot: Is a graph showing two sets of quantitative data on a coordinate plane.
- Explanatory Variable (x): is the variable that is trying to explain changes in y.
- Response Variable (y): is the value obtained at a specific x-value.

Correlation

- The main result of a correlation is called the **correlation coefficient** (or "r"). It ranges from -1.0 to +1.0. The closer r is to +1 or -1, the more closely the two variables are related.
- If r is close to 0, it means there is no linear relationship between the variables.
- If r is positive, it means that as one variable gets larger the other gets larger.
- If r is negative it means that as one gets larger, the other gets smaller

Correlation

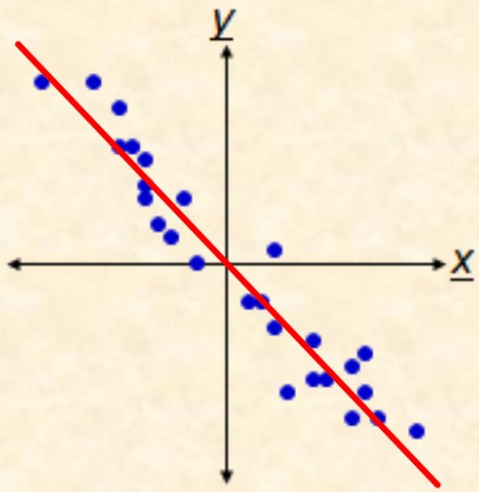
positive correlation



r is close to 1

As x increases y increases as well

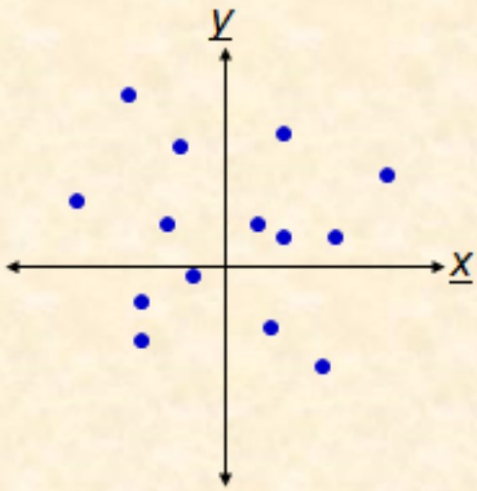
negative correlation



r is close to -1

As x increases y decreases

no reliable correlation

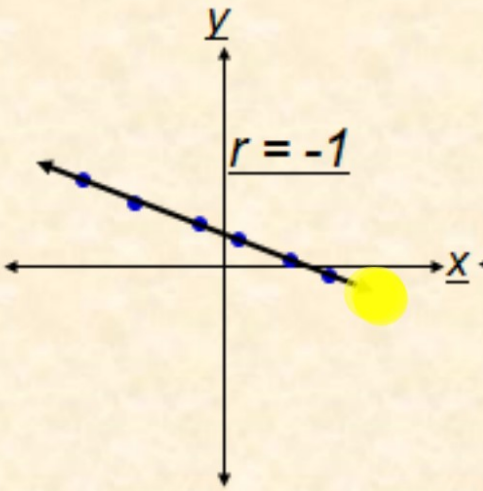


r is close to 0

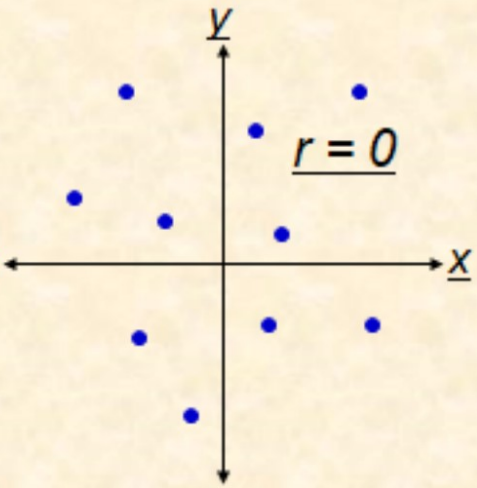
NO linear relationship

Correlation and Prediction

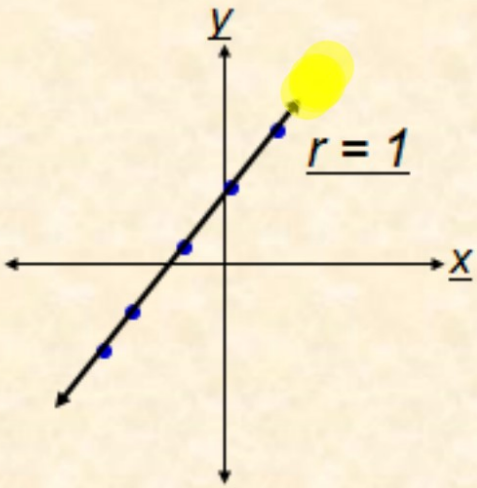
perfect negative correlation



no reliable correlation

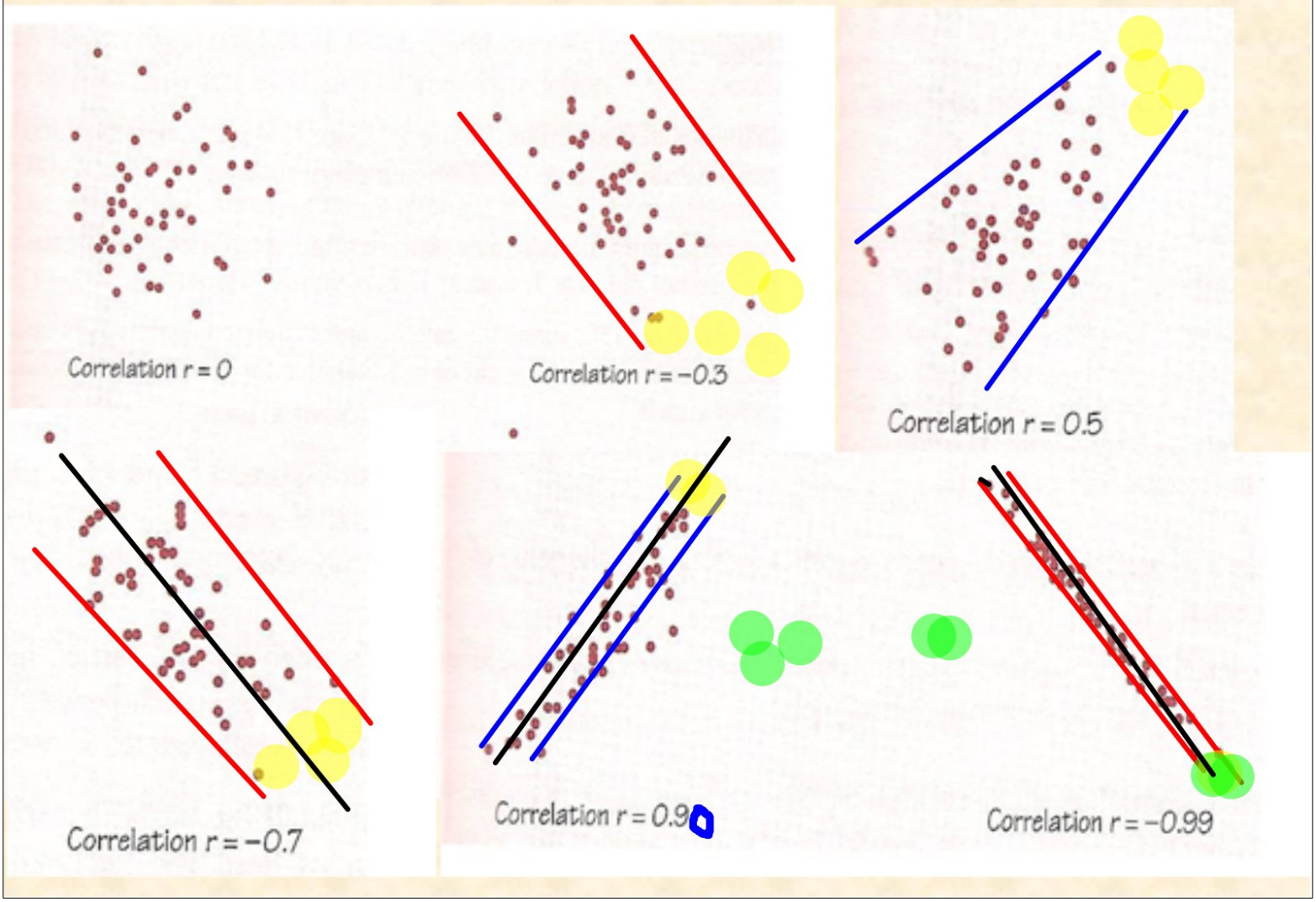


perfect positive correlation

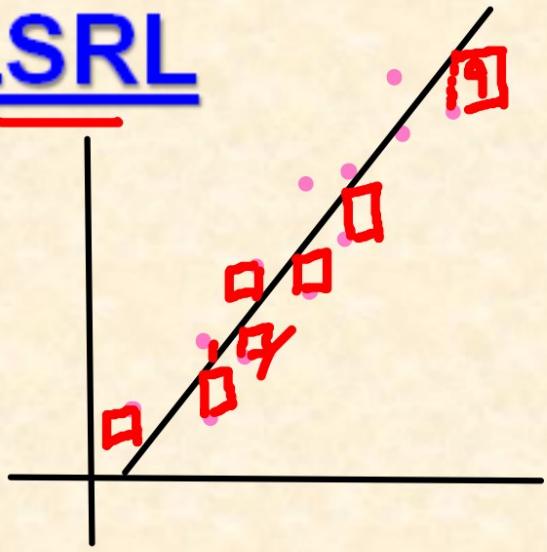


If r is equal to 1 or -1 then every data point would be on the same line.

Other examples of correlation coefficients



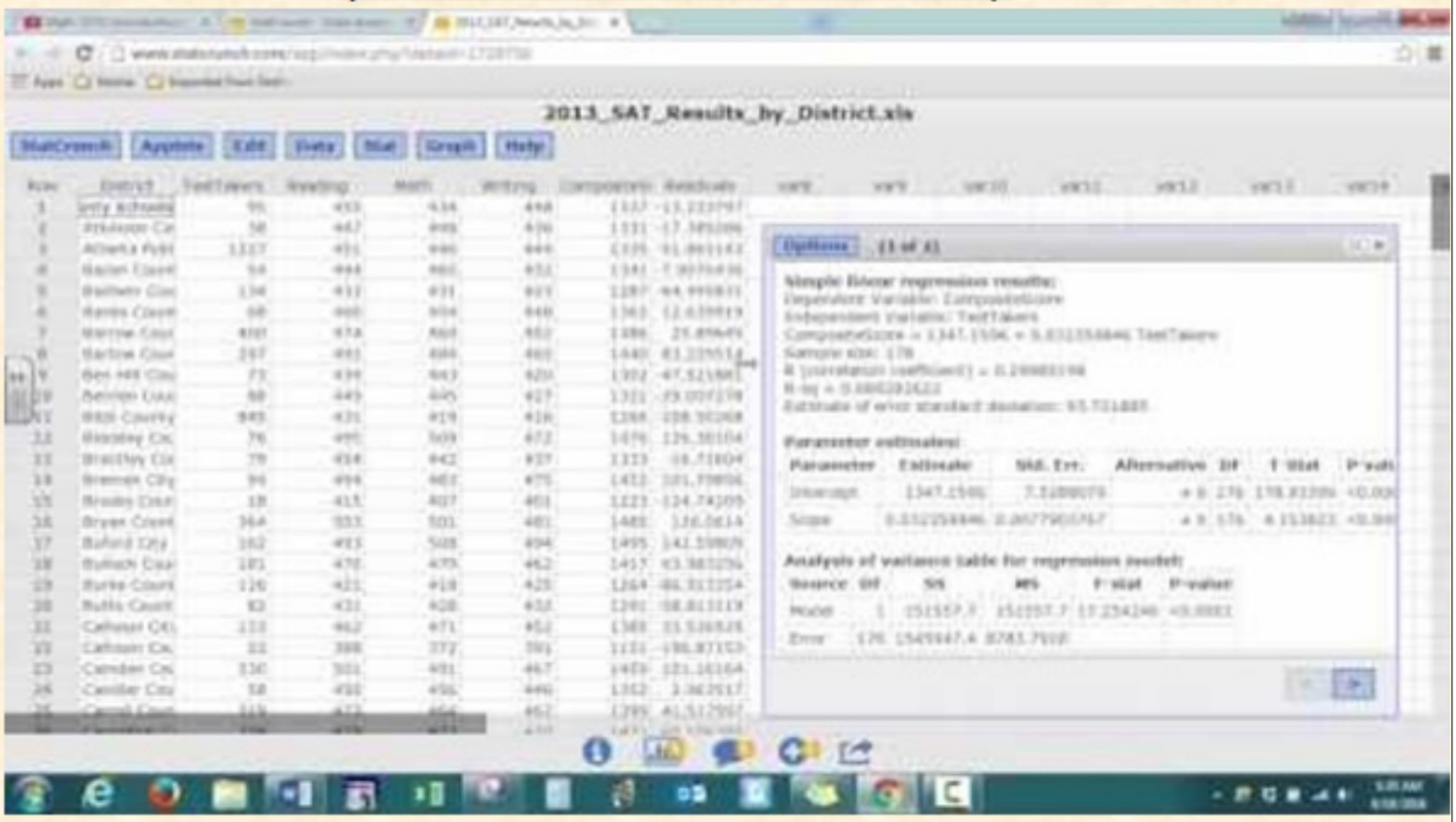
Equation of LSRL



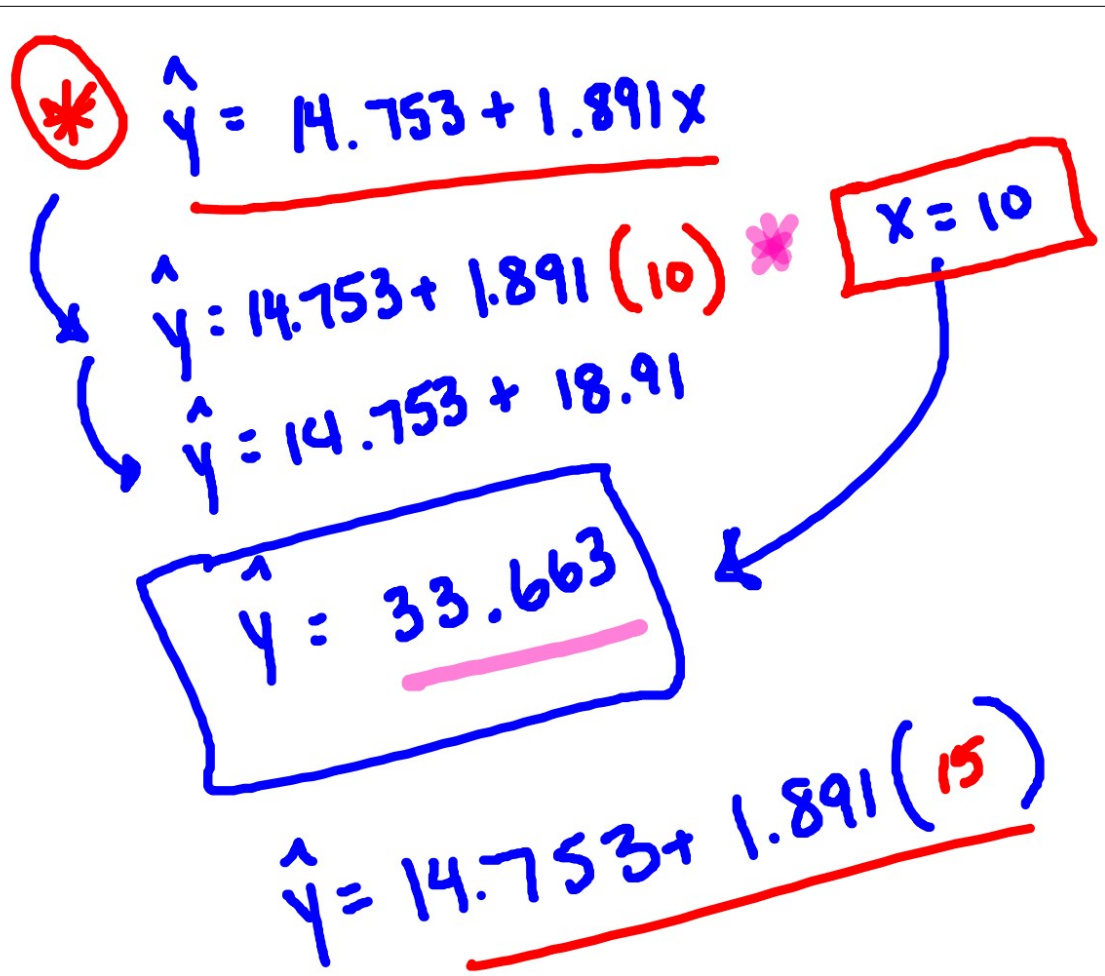
- $\hat{y} = a + bx$
- a = y - intercept
- b = slope
- $\hat{y}$ = predicted y-value
- This equation will be found by using Stat Crunch

Least-Squares Regression Line (LSRL)

(line that best fits the data)



VIDEO TUTORIAL STATCRUNCH


$\hat{y} = 14.753 + 1.891x$
$\hat{y} = 14.753 + 1.891(10)$
$x = 10$
$\hat{y} = 14.753 + 18.91$
$\hat{y} = 33.663$
$\hat{y} = 14.753 + 1.891(15)$