Math 3339

Section 27204
MWF 10-11:00am AAAud 2

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Will post off. hrs on CASA calendar

~~Office Hours:~~
~~M & Th noon – 1:00 pm & T 1:00 – 2:00 pm~~
~~and by appointment~~

Below is the computer output for the appraised value (in thousands of dollars) and number of rooms for houses in East Meadow, New York. Calculate a 95% confidence interval for the slope of the true regression line.

The regression equation is value = 74.8+ 19.7 rooms

Predictor	Coef	Stdev	t-ratio
Constant	74.80	19.04	3.93
Rooms	$\boxed{19.718}$	2.631	7.49

S = 29.05 R-sq = 43.8% R-sq (adj) = 43.0%

Analysis of Variance

with simple linear reg. m=2

Source	DF		SS	MS	F	P
Regression	1	m-1	47398	47398		
Error	72	N-m	60775	844		
Total	73	N-1	108173			

Note Formula Sheet Does not have $F = \frac{MSTr}{MSE}$

df for two sample t use $\min(n_1-1, n_2-1)$ not v.

$$\hat{\beta}_1 \pm t_{\alpha/2} SE_{\hat{\beta}_1}$$

$19.718 \pm qt(1.95/2, \underset{n-2}{72}) \cdot 2.631$

2. A potato chip company calculated that there is a mean of 74.1 broken potato chips in each production run with a standard deviation of 5.2. If the distribution is approximately normal, find the probability that there will be fewer than 60 broken chips in a run.

$P(X<60) = \text{pnorm}(60, 74.1, 5.2)$

if said prob that on average 60 broken chips in 25 runs

$P(\bar{X}<60) = \text{pnorm}(60, 74.1, 5.2/\sqrt{25})$

prop.

16. It has been estimated that as many as 70% of the fish caught in certain areas of the Great Lakes have liver cancer due to the pollutants present. Find an approximate 95% range for the percentage of fish with liver cancer present in a sample of 130 fish.

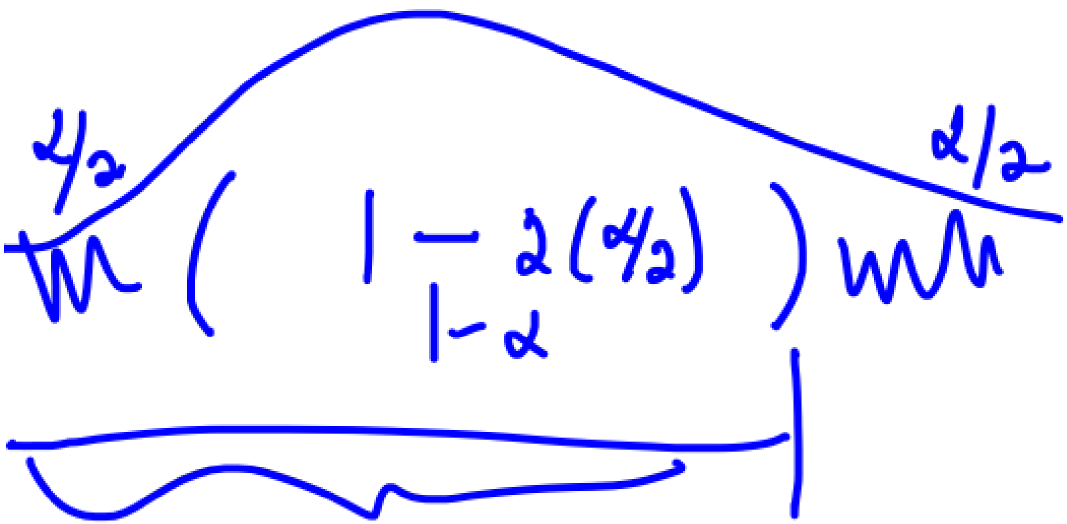
conf. interval

qnorm(1.95/2)

1.96

$$.70 \pm 1.96\sqrt{\frac{.7(.3)}{130}}$$

$$\frac{1+1-\alpha}{2}$$

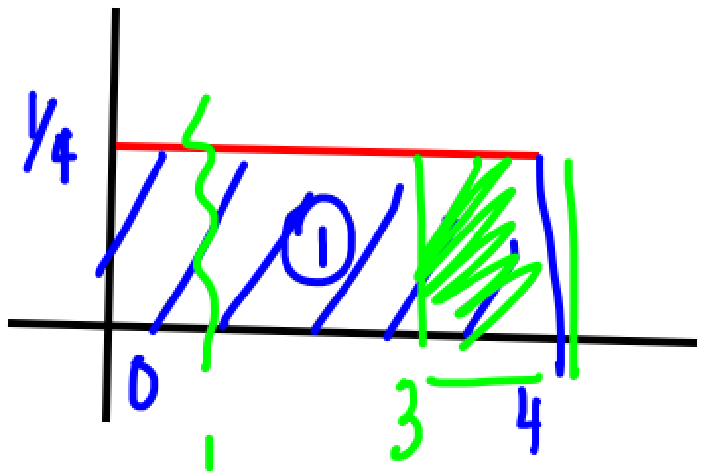


$$\alpha/2 + 1 - \alpha = 1 - \alpha/2 = \frac{2-\alpha}{2}$$

18. It has been determined that the amount of time that videotapes are returned late to a certain rental store is modeled by a uniform distribution from 0 to 4 days. Answer each question showing a figure and your work.

   a. What is the probability that a randomly selected videotape will be returned between 3 and 4 days late?

   b. What is the probability that a randomly selected videotape will be returned more than 1 day late?



7. The following table displays the results of a sample of 100 in which the subjects indicated their favorite ice cream of three listed. The data are organized by favorite ice cream and age group. What is the probability that a person chosen at random will be over 40 if he or she favors chocolate?

given

Age	Chocolate	Vanilla	Strawberry	
Over 40	15	8	7	30
20 – 40	20	11	15	46
Under 20	8	7	9	24
	43	26	31	100

$$P(>40 \mid Choc) = \frac{P(>40 \cap Choc)}{P(Choc)} = \frac{15/100}{43/100}$$

$$= 15/43$$

$P(B) = P(B|A)$

A + B are indep $\Rightarrow$ $P(A \cap B) = P(A) \cdot P(B)$

A + B dependent $\Rightarrow$ $P(A \cap B) = P(A) \cdot P(B|A)$

$$P(B|A) = \frac{P(A \cap B)}{P(A)}$$

$P(A) = .2 \quad P(B) = .3 \quad P(A \cup B) = .5$

$P(A \cap B) = 0$

Disjoint

$P(A \cup B) = .4 \Rightarrow P(A \cap B) = .1$

15. A sample of 100 engineers in a large consulting firm indicated that the mean amount of time they spend reading for pleasure each week is 1.4 hours. Three interns independently calculate different two-sided confidence intervals of the true mean amount of time for all of the engineers in the company. The confidence intervals of the interns were:

A) (.17, 2.63) B) (.554, 2.446) C) (1.167, 1.633)

a. All are calculated correctly with different levels of confidence.
b. A and C have reasonable intervals, but B does not.
c. A and B have reasonable intervals, but C does not.
d. B and C have reasonable intervals, but A does not.
e. None of these intervals is reasonable.

are they centered at 1.4? $\dfrac{\text{add endpts}}{2}$

Practice Final

An important problem in industry is shipment damage. A windshield factory ships its product by truck and determines that it cannot meet its profit expectations if, on average, the number of damaged items per truckload is greater than 12. A random sample of 12 departing truckloads is selected at the delivery point and the average number of damaged items per truckload is calculated to be 11.3 with a calculated sample of variance of 0.49. Select a 99% confidence interval for the true mean of damaged items.

$n=12 \qquad \bar{x}=11.3 \qquad s^2=.49$

99% CI

$$11.3 \pm \bigcirc \frac{\sqrt{.49}}{\sqrt{12}}$$

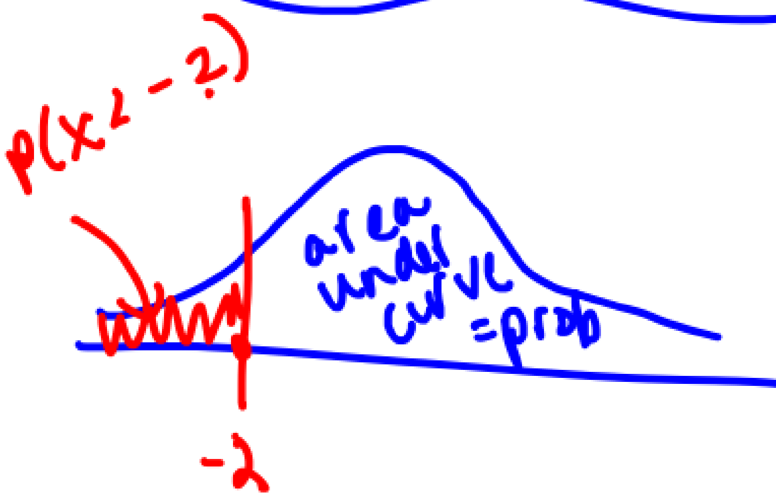
$qt(1.99/2, 11)$

pop.

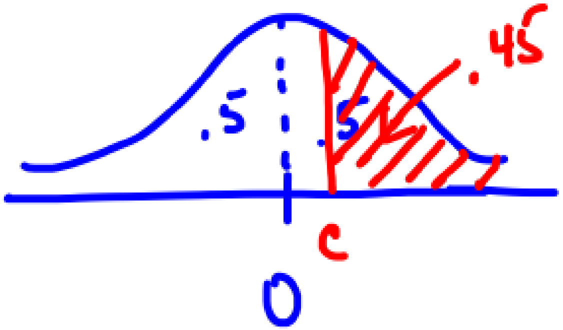
Current research indicates that the distribution of the life expectancies of a certain protozoan is normal with a mean of 41 days and a standard deviation of 10.6 days. Find the probability that a simple random sample of 49 protozoa will have a mean life expectancy of 42 or more days.

$$P(\bar{x} \geq 42) = 1 - P(\bar{x} < 42)$$

$$1 - \text{pnorm}(42, 41, 10.6/\sqrt{49})$$

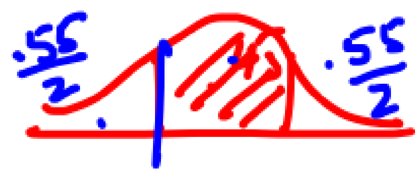


Find a value of c so that $P(Z \geq c) = 0.45$.



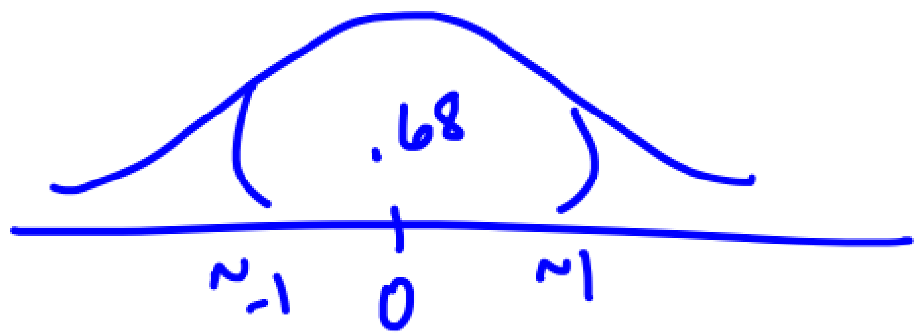
qnorm(1-.45)

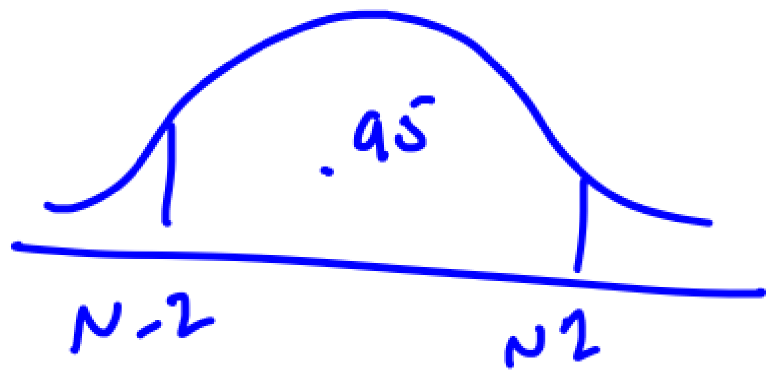
$P(|Z| < c) = .45 \Rightarrow P(-c < Z < c) = .45$



qnorm(1.45/2)

$P(|Z| > c) = .45$


.68
~-1
0
~1


.95
N-2
N2

Given a data set consisting of 33 unique whole number observations, its five-number summary is:

min Q1 med Q3 max

$$[17, 30, 42, 57, 73]$$

How many observations are strictly less than 30?

17 . . . . . 30 . . . . . 42 . . . . 57 73

16 1 16

30 is their avg.

8 8

Question 19

$n_c = 35 \quad \bar{x}_c = 3411 \quad s_c = 468$

$n_w = 36$

$\bar{x}_w = 3133$

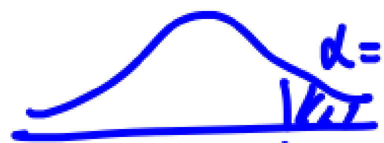
$s_w = 642$

You did not answer the question.

A national computer retailer believes that the average sales are greater for salespersons with a college degree. A random sample of 35 salespersons with a degree had an average weekly sale of \$3411 last year, while 36 salespersons without a college degree averaged \$3133 in weekly sales. The standard deviations were \$468 and \$642 respectively. Is there evidence at the 5% level to support the retailer's belief?
Select the [p-value, Decision to Reject (RH_0) or Failure to Reject (FRH_0)].

$H_0: \mu_c = \mu_w$

$H_a: \mu_c > \mu_w$



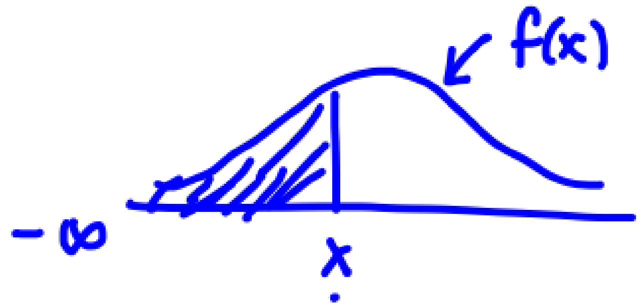
$\alpha = .05$

qt(.95, 34)

$$t = \frac{3411 - 3133}{\sqrt{\frac{468^2}{35} + \frac{642^2}{36}}} = \_\_\_$$

$$\text{p value}: \; P(t > \_\_\_) = 1 - pt(\_\_\_, 34)$$

$$f(x) = F'(x)$$



$$F(x) = \begin{cases} 0 & x < 0 \\ \dfrac{x^3}{27} & 0 \le x \le 3 \\ 1 & x > 3 \end{cases}$$

$$F(x) = P(X \le x) = \int_{-\infty \text{ or } 0}^{x} f(x)\,dx$$

$$P(X \ge 1.5) = 1 - P(X \le 1.5) = 1 - F(1.5)$$

$$F(a) = 1 \qquad F(a) = \frac{a^3}{27} \Rightarrow a = 3$$

$$E[X] = \int_0^3 x f(x)\,dx = \int_0^3 x \cdot \frac{x^2}{9}\,dx = \int_0^3 \frac{x^3}{9}\,dx$$

$$E[X^2] = \int_0^3 x^2 f(x)\,dx$$