KEY

AP Statistics – confidence intervals for one sample mean σ unknown – 2 El Gargy problems

1. Kerplakistanis are very proud of their back hair. They often go to salons to have it styled. El Gargy owns a popular franchise of hundreds of these salons across Kerplakistan. It's called "Back Scissorwhiz". He is interested to see how many customers his stores are averaging on a Saturday. He does not have time to check store receipts for every one of his franchises, so he randomly selected 30 stores from across Kerplakistan to send their Saturday receipts to him. He discovered that the 30 stores averaged 22.3 customers per day with a standard deviation of 5.5 people. Can you provide El Gargy with an estimate of the average number of Saturday customers for all of his stores by providing him with a 95% confidence interval estimate?

1 sample t interval

Random ✓ 10% ✓ owns > 300 large counts ✓ $n \geq 30$

$\bar{x} = 22.3$

$s_x = 5.5$

$t^* = -2.05$

$df = 29$

$22.3 \pm 2.05 \frac{5.5}{\sqrt{30}}$

$(20.24, 24.36)$

We are 95% confident the interval from 20.24 to 24.36 captures the true mean number of Saturday customers for El Gargy's stores.

KEY

2. El Gargy owns many goat cheese farms across Kerplakistan. He has received many complaints from the managers of these farms that he often doesn't order enough feed for the goats to thrive and make tasty cheese. The amount of feed necessary is based on the weight of the goat. One months supply for one goat has to be quadruple his own weight. A 115 lb goat needs 460 lbs of feed for one month. El Gargy owns thousands of these farms so he can't measure the average weight of all his goats. He selects a farm that is local to his headquarters and measures the weight of 18 random goats on that farm. Here is the weight of those goats in lbs:

115	159	95	150	159	153	121	177	219
123	154	139	158	136	181	122	77	136

Can you estimate how much feed per goat El Gargy should order for all his goat farms so that El Gargy can be 99% sure of the estimate?

70-99	11
100-119	1
120-139	4
140-159	4
160-179	1
180-199	1
200-219	1

1 Sample t-test

Random X

convenience sample Proceed, but with caveat that for reliable results E Gargy should throw away & start over!

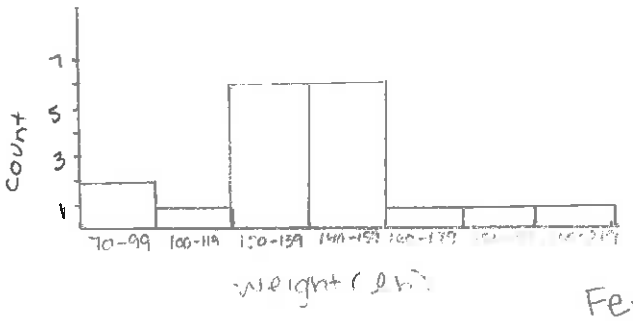
10%

> 180 goats

Large Counts

n < 30

check graph



no strong skewness

no outliers

so use t

$\bar{x} = 143$ lb

$s_x = 32.78$

$n = 18$

$df = 17$

(120.61, 165.39)

Feed

120.6 (4) = 482.4 lb

165.4 (4) = 661.6 lb

We recommend El Gargy throw away data & do a random sample of goats instead.

If this were a random sample we would be 99% confident the interval 120.6 lb to 165.4 lb captures the true mean weight all of El Gargy's goats. However, we are 99% confident this interval captures the true mean weight on this farm. On this farm he should order between 482.4 lb to 661.6 lb of feed.