Answers Ch 10.2 p. 649 - 650

30.

State: We will create a 95% confidence interval for a 1-sample mean to estimate the true population mean of vitamin C content of CSB produced at this factory.

Plan:

Parameter: μ = the true population mean of vitamin C content of CSB produced at this factory

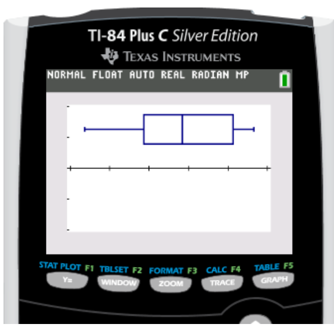
Random: The problem states a random sample of size 8 was taken at this factory.

Independence: Observations taken from the same production line would not be considered independent, but could be considered representative if all CSB produce in this run.

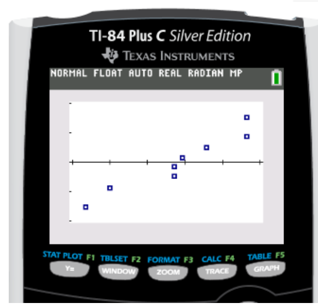
population of all CSB produced $\geq$ 10(8) Condition met for independence

Large Counts: n = 8 Sample size small. Must look at graph to decide distribution of sample.

Boxplot shows no outliers present



Normal Probability Plot show linear trend



Normal Approximation appropriate

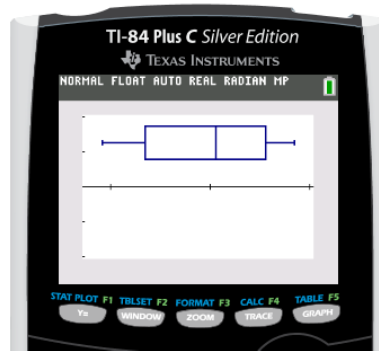
Do:

$\bar{x} = 22.5$ $s = 7.19$ $n = 8$ $df = 7$ $t^* = 2.365$ $22.5 \pm 2.365\left(\frac{7.19}{\sqrt{8}}\right)$ $(16.488, 28.512)$

We are 95% confident the true population mean of vitamin C content of CSB produced during this run is in the interval 16.488 to 28.513 mg/100g.

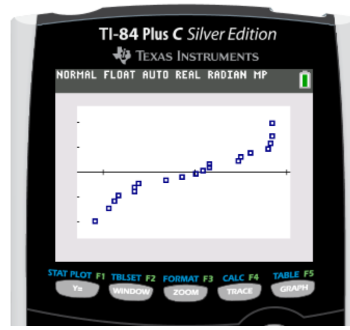
31. $\bar{x} = 22.5$ $s = 7.19$ $\tilde{x} = 18.9$ $n = 20$

(RECALL: SOCS)



a) The distribution of mpg for these 20 vehicles is somewhat skewed left.
The measure of center, median, is located at 18.9.
The measure of spread, IQR, is 21.25 – 15.6 = 5.65. The spread of the data is from 13.6 mpg to 22.6 mpg.
The boxplot shows no apparent outliers. This is justified by the lower and upper fence formulas:

LF: 15.6 – (1.5 x 5.65) = 7.125 UF: 21.25 + (1.5 x 5.65) = 29.725



b) Since the sample size n = 20 is less than 30, the Central Limit theorem does not apply.
However since the boxplot shows no severe skewness and the data has no outliers, and the Normal probability plot has somewhat of a linear trend, a Normal approximation would be appropriate for this sample distribution of vehicle gas mileage.

c) **State:** We will create a 95% confidence interval for a 1-sample mean to estimate the true population mean gas mileage for this particular vehicle.

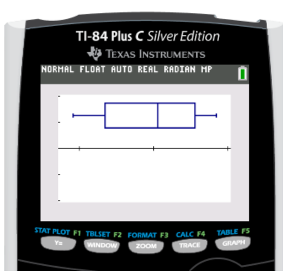
Plan: Parameter: μ = the true population mean gas mileage for this particular vehicle.

Random: The problem states a random sample of 20 cars' gas mileage was recorded.

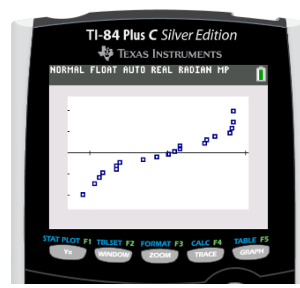
Independence: population of all vehicles of this model $\geq$ 10(20) Condition met for independence

Large Counts: n = 20 Sample size small. Must look at graph to decide distribution of sample.

Boxplot shows no severe skewness and the data has no outliers.



Normal probability plot has somewhat of a linear trend.



Normal Approximation appropriate

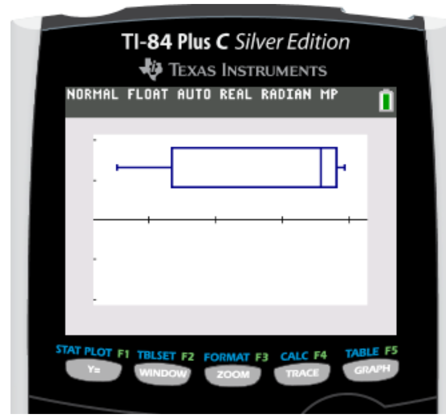
Do:

$\bar{x} = 18.48$ $s = 3.1158$ $n = 20$ $df = 19$ $t^* = 2.093$ $18.48 \pm 2.093\left(\frac{3.1158}{\sqrt{20}}\right)$ $(17.022, 19.938)$

We are 95% confident the true population mean gas mileage for this particular vehicle is in the interval 17.022 mpg to 19.938 mpg.

d) We **cannot** apply this to other vehicles. This sample of cars is **not representative** of all vehicles.

32. $\bar{x} = 59.59$ $s = 6.2553$ $\tilde{x} = 63.3$ $n = 9$



a) The distribution of percent of nitrogen found in gas bubbles within amber (hardened tree resin) is left-skewed.
The measure of center, median, is located at 63.3.
The measure of spread, IQR, is 64.45 – 52.9 = 11.55.The spread of the data is from 49.1% to 65%.
The boxplot shows no apparent outliers. This is justified by the lower and upper fence formulas:

LF: 52.9 – (1.5 x 11.55) = 35.575 UF: 64.45 + (1.5 x 11.55) = 81.775

b) **State:** We will create a 95% confidence interval for a 1-sample mean to estimate the true population mean of the percent of nitrogen in ancient air.

Plan: Parameter: μ = the true population mean of percent of nitrogen found in gas bubbles within amber

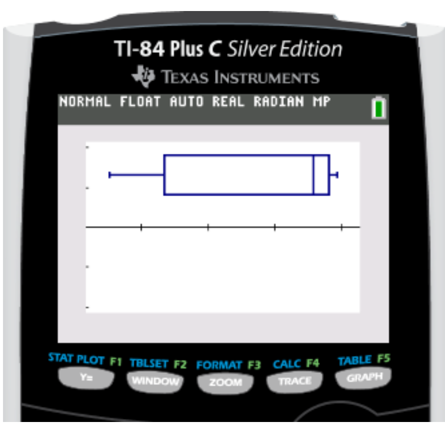
Random: The problem states we may assume these amber specimens are a SRS from the late Cretaceous atmosphere.

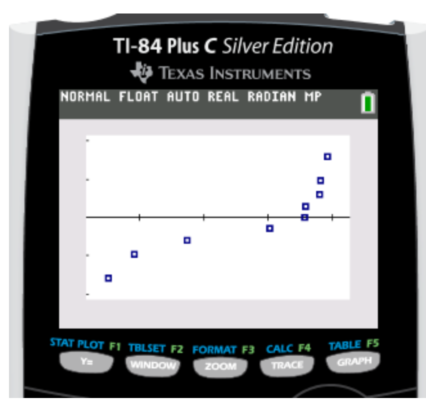
Independence: population of all amber specimens from the late Cretaceous atmosphere $\geq 10(9)$ Condition met for independence

Large Counts: n = 9 Sample size small. Must look at graph to decide distribution of sample.

Boxplot shows some skewness, however for such small sample size, the data are not unreasonably skewed. But the data has no apparent outliers.

Normal probability plot has somewhat of a linear trend.





Do:

$\bar{x} = 59.59$ $s = 6.2553$ $n = 9$ $df = 8$ $t^* = 2.306$ $59.59 \pm 2.306\left(\dfrac{6.2553}{\sqrt{9}}\right)$ $(54.781, 64.397)$

We are 95% confident the true population mean of the percent of nitrogen in the atmosphere during the late Cretaceous era is between 54.78% and 64.4%.