

**Instructions:** For each of the following problems, follow the steps described to draw a graph of the provided data of the specified type.

1. Create a pie chart for the following data. A circle is provided for your convenience.  
A sample of 20 students who had recently taken elementary statistics yielded the following information on the brand of calculator owned (T=Texas Instrument, H=Hewlett Packard, C=Casio, S=Sharp).

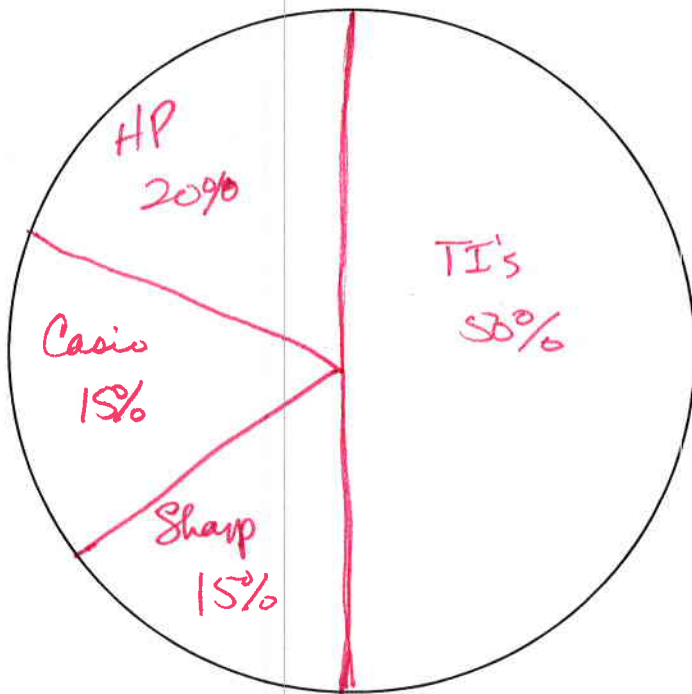
T	T	H	T	C	T	T	S	C	H
S	S	T	H	C	T	T	T	H	T

Do the following:

- a) Count the number of hits in each of the 4 categories. Find the proportion of the 20 in each category.
- b) Multiple the proportion by 360 to get the number of degrees you need in the circle for the pie slice.
- c) To be precise, you can use a protractor, but for this exercise, estimate the correct slice size. Be sure that slices representing larger percentages really are larger. Label each slice appropriately.
- d) Put a title on your chart that tells readers what the chart is displaying.

T = 10  
H = 4  
C = 3  
S = 3

$\frac{10}{20} = 50\% \Rightarrow 180^\circ$   
 $\frac{4}{20} = 20\% \Rightarrow 72^\circ$   
 $\frac{3}{20} = 15\% \Rightarrow 54^\circ$

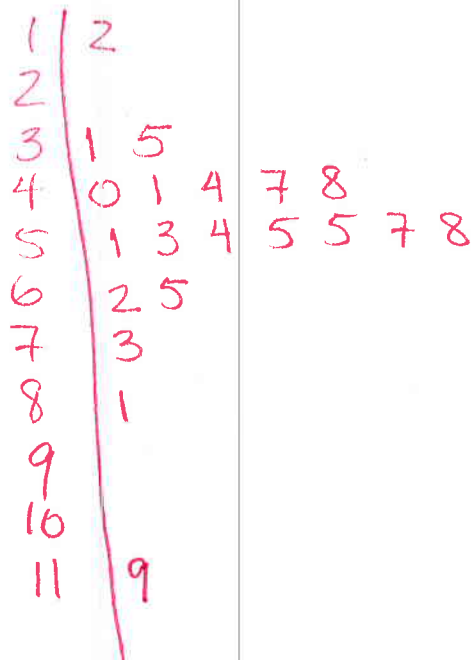


portion of calculators used by stats students

2. A stem-and-leaf plot (or also called just a stem plot) displays data in a distribution without losing the original data. A data set is displayed below. Put this data in a stem-and-leaf display.

12	31	35	40	41	44	47	48	51	53
54	55	55	57	58	62	65	73	81	119

- Sort the data set if it is not already sorted.
- Since the 10's digit represents more than 5 categories, we can use it as our stem. Draw a vertical line and list the initial ten's digits on the left side of the line. Do not skip any possible values even if there is no data in the list for that unit of 10 (for instance, you need a stem for 2 (20's) even though there is no data in the range of 20-29).
- The leaves are the ones digits. List them in order on the right side of your vertical line. Space them carefully so that each digit takes up the same amount of space.
- Be sure to include a key to help translate your graph to readers (for instance  $6|5=65$ ).
- If these numbers represent placement scores on a test of algebra knowledge whose range is 0 to 120, add a title to your graph to tell readers what it represents.

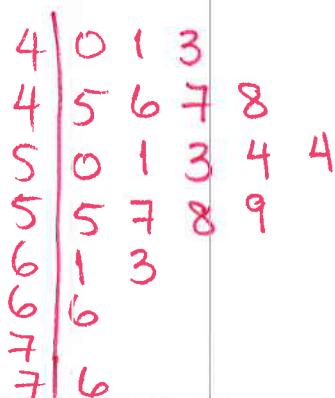


Key  
 $6|5=65$

Stem Plot of Algebra Scores  
 on Placement Test

3. If the data was as shown below, however, we would need to split the 10's into 5's with two stems for each 10's unit representing the lower half (ones digits 0-4) and another the upper half (ones digits 5-9). Use the data below and repeat the above exercise with that change.

40	41	43	45	46	47	48	50	51	53
54	54	55	57	58	59	61	63	66	76



Key  
 $4|5=45$

Stemplot of Algebra Scores  
 on Placement Test

4. Draw a histogram for the length of French movies shown below. With 8 bins.

81	90	90	92	93	94	95	96	96	102
103	105	106	111	113	116	119	122	122	123
125	125	128	137	158					

- Find the minimum and maximum value of the data.
- Take the difference and divide by the number of bins (here, that's 8).
- When doing this by hand, it's often convenient to round. For this exercise round to the nearest tenth (one decimal place). Call this number  $w$  (for the width of the bins).
- Your smallest bin starts with the smallest value. Add  $w$  to it to obtain the smallest value for the next bin. Keep doing this until you get to a number larger than the maximum value. You should have about 8 bins. Rounding may throw this off a bit, but that's okay for this exercise.
- Find the midpoint of each bin. This is the number we will put on the graph to label each category. To find this, you can take the smallest number in each bin and add half the width. Plot these points on horizontal axis of the graph.
- The vertical axis is either the frequency or the percentage of data in that category. Draw bars centered on the midpoints you plotted to appropriate heights for each bin.
- Label your axes and give your graph a title.

Min = 81

Max = 158

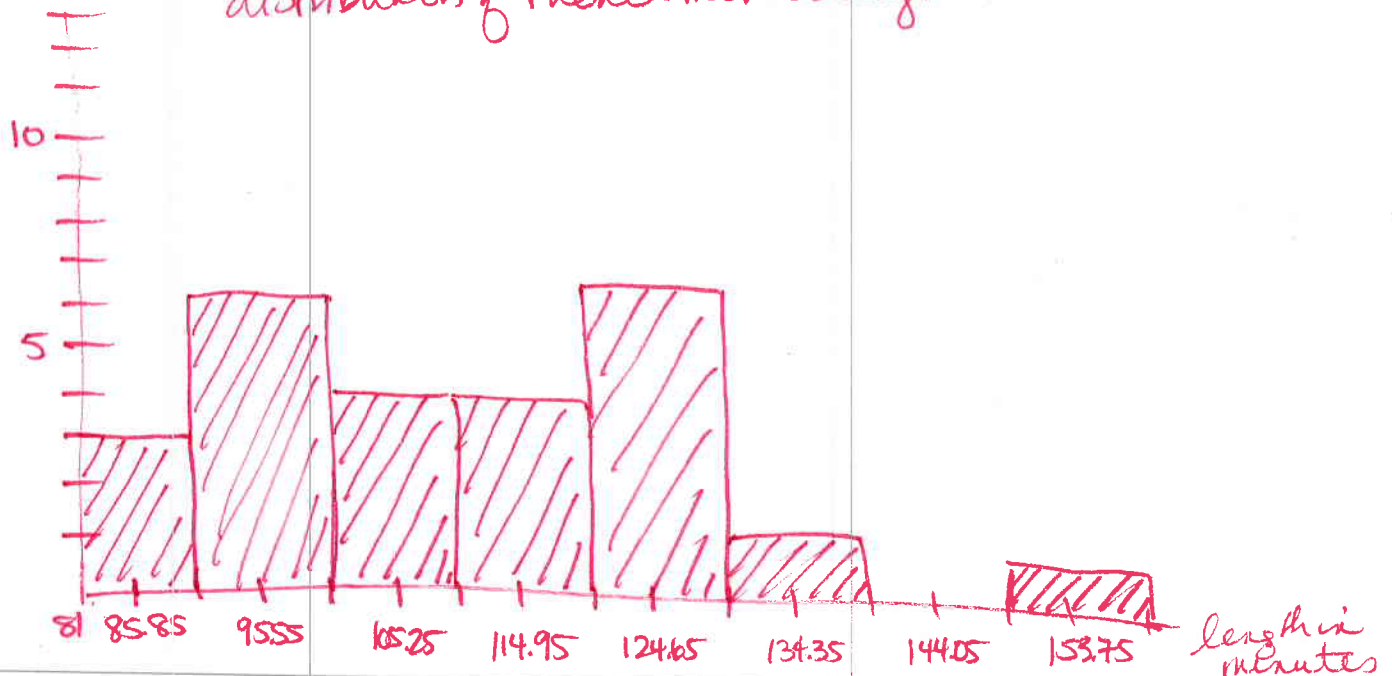
$$\frac{158 - 81}{8} = 9.625 \Rightarrow 9.7 \text{ (round up)}$$

$w = 4.85$

bins : 81  $\rightarrow$  90.7  $\rightarrow$  100.4  $\rightarrow$  110.1  $\rightarrow$  119.8  $\rightarrow$  129.5  $\rightarrow$  139.2  $\rightarrow$  148.9  $\rightarrow$  158.6

midpoints : 85.85, 95.55, 105.25, 114.95, 124.65, 134.35, 144.05, 153.75

distribution of French movie lengths



5. To draw a box plot (also called a box-and-whisker plot) we will need the 5-number summary. The 5-number summary is the Minimum, First Quartile, the Median, the Third Quartile, and the Maximum. Create a boxplot for the lengths of American movies (in minutes) shown below.

94	90	95	93	128	95	125	91	104	116
162	102	90	110	92	113	116	90	97	103
95	120	109	91	138					

- Sort the data if it is not sorted already.
- What is the minimum value?
- What is the maximum value?
- What is the median? In the sorted list, remember, this is the middle value if there are an odd number of values, or the average of the two middle values if there is an even number of values.
- The quartiles are found similarly to the median. In the sorted list, take all the values below the median and find the median of those values: this is the first quartile. In the sorted list, take all the values above the median and find the median of those values: this is the third quartile.
- Draw a graph that extends from the minimum value to the maximum value (label both), and divide up the axis into segments. The scale of your graph should be evenly spaced and not distorted.
- Plot dots for min, Q1, the median, Q3 and max on the graph. Draw a box around Q1 and Q3 and the line for the median. Extend the "whiskers" to the min and the max.
- Label your axis appropriately and put a title on the graph.

90, 90, 90, 91, 91, 92, 93, 94, 95, 95, 95, 97, 102, 103, 104,  
109, 110, 113, 116, 116, 120, 125, 128, 138, 162

min: 90  
max: 162

Med: 102

Q1 = 92.5

Q3 = 116

5# Summary

25 data points  
#13 is Median

#6 + #7 avg is Q1 = 92.5

#19 + #20 avg is Q3 = 116

(1VarStats)

American movie lengths in minutes

