§3.3 & 3.4: Skewed Data & Boxplots

1.] In the Super Bowl, by how many points does the winning team outscore the losers? Here are the winning margins for the first 52 Super Bowl games (in order):

1	3	3	3	3	3	3	4	4	4	4	4	4
5	6	6	7	7	7	8	9	10	10	10	11	$\boxed{12}$
$\boxed{12}$	13	14	14	14	15	15	16	17	17	17	17	18
19	19	21	22	23	27	27	29	31	32	35	36	45

a.) Find the sample median and mode of these data.

mode: 3, 4

median: M = "average of 26th and 27th entry" $= \frac{12+12}{2} = \boxed{12}$

b.) Without actually finding the mean, determine if it is larger or smaller than the median. Briefly explain why.

The mean would be larger than the median because we know from the previous worksheet that this data set is right skewed.

c.) Find the quartiles, IQR, and "fences" of these data.

Q_L = "average of 13th & 14th entry" $= \frac{4+5}{2} = \boxed{4.5}$

Q_U = "average of 39th & 40th entry" $= \frac{18+19}{2} = \boxed{18.5}$

$\Rightarrow IQR = Q_U - Q_L = \boxed{14}$

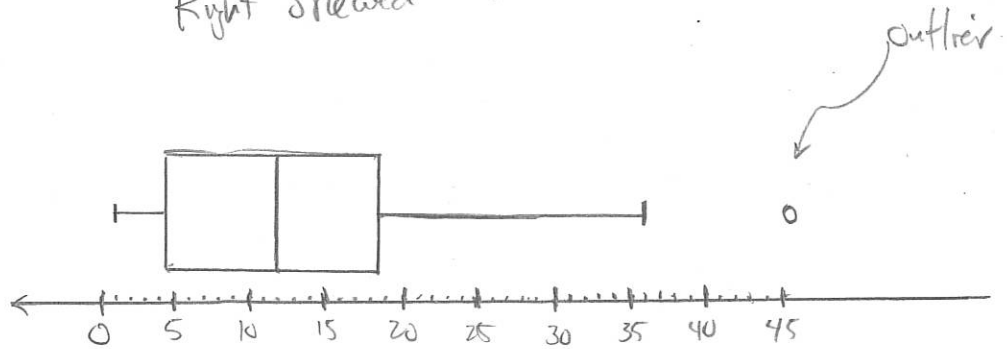
Lower Fence $= Q_L - 1.5\,IQR = 4.5 - 1.5(14) = \boxed{-16.5}$

Upper Fence $= Q_U + 1.5\,IQR = 18.5 + 1.5(14) = \boxed{39.5}$

d.) Create a boxplot of these data.

Note: the point 45 is an outlier – it is beyond the upper fence.

Right Skewed

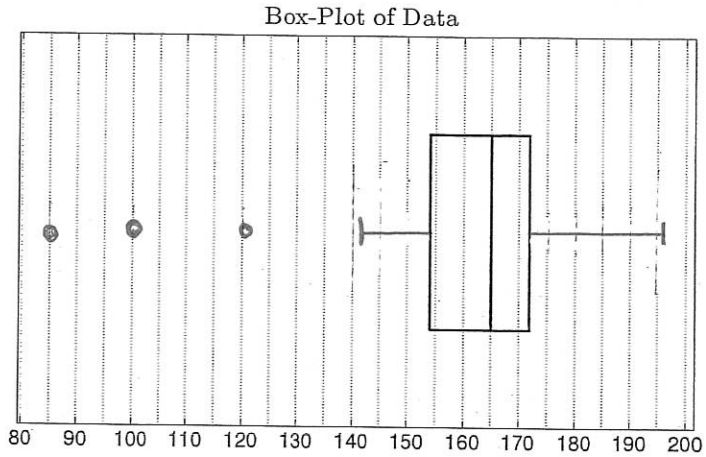


Middle half of data is roughly symmetric.

2.] Consider the following ordered sample data and partially constructed boxplot below:

Data:

85	100	121	142	151	157	158
159	161	163	165	166	170	171
171	172	172	173	184	187	196



a.) Compute the five-number summary of this data set using the data and the boxplot.

min = $\boxed{85}$

$Q_L = \frac{151+157}{2} = \boxed{154}$

$M = \boxed{165}$

$Q_u = \frac{172+172}{2} = \boxed{172}$

max = $\boxed{196}$

Range = max − min = 196 − 85 = 111

IQR = $Q_u - Q_L$ = 172 − 154 = 18

b.) Draw the whiskers on the boxplot above by first computing the fences.

Lower Fence = $Q_L - 1.5\,IQR$ = 154 − 1.5(18) = 154 − 27 = 127

Upper Fence = $Q_u + 1.5\,IQR$ = 172 + 1.5(18) = 172 + 27 = 199

- Upper whisker extends to 196
- Lower whisker extends to 142

c.) Identify any outliers mark them on the boxplot with the correct notation.

The data points 85, 100, and 121 are considered outliers since they lay below the lower fence which is 127

d.) Although the right whisker is longer than the left, we would still say this distribution is left skewed because of the outliers.