

Unit 6B Test 1

Name: _____

Date: _____

Use the following sets of SAT scores to answer the following questions.

SAT Scores for Men	SAT Scores for Women
1059 1328 1175 1123 923 1017 1214	1226 965 841 1053 1056 1393 1312
1042 1313 1040 1100 1290 990 1300	1222 1100 1215 1300 1296 985 1350

1. Compute the mean and the median for each set of data.

$$\text{Mean} = \frac{\text{Sum of all data values}}{\text{Number of data values}}$$

a. SAT scores for men

Sum of all data values = 15914

Number of data values = 14

$$\text{Mean} = \frac{15914}{14} = \mathbf{1136.7}$$

$$\text{Median} = \frac{1123+1100}{2} = \mathbf{1111.5}$$

b. SAT Scores for women

Sum of all data values = 16314

Number of data values = 14

$$\text{Mean} = \frac{16314}{14} = \mathbf{1165.3}$$

$$\text{Median} = \frac{1222+1215}{2} = \mathbf{1218.5}$$

2. Compute the 5-Number Summary for each set of data.

a. scores for men

Step 1: Arranging dataset in ascending order

923, 990, 1017, 1040, 1042, 1059, 1100, 1123, 1175, 1214, 1290, 1300, 1313, 1328

Step 2: Finding Minimum and maximum:

Minimum = 923, Maximum = 1328

Step 3: Finding the median

$$\text{Median} = \frac{1123+1100}{2} = 1111.5$$

$$\text{Step 4: First Quartile: } Q1 = \frac{1017+1040}{2} = 1028.5$$

$$\text{Step 5: Third Quartile: } Q3 = \frac{1290+1300}{2} = 1295$$

Therefore:

1: Minimum = 923

2: Maximum = 1328

3: Median = 1111.5

4: First quartile $Q1 = 1028.5$

5: Third Quartile $Q3 = 1295$

b. scores for women

Step 1: Arranging dataset in ascending order

841, 965, 985, 1053, 1056, 1100, 1215, 1222, 1226, 1296, 1300, 1312, 1350, 1393

Step 2: Finding Minimum and maximum:

Minimum = 841, Maximum = 1393

Step 3: Finding the median

$$\text{Median} = \frac{1222+1215}{2} = 1218.5$$

$$\text{Step 4: First Quartile: } Q1 = \frac{985+1053}{2} = 1019$$

$$\text{Step 5: Third Quartile: } Q3 = \frac{1300+1312}{2} = 1306$$

Therefore:

1: Minimum = 841

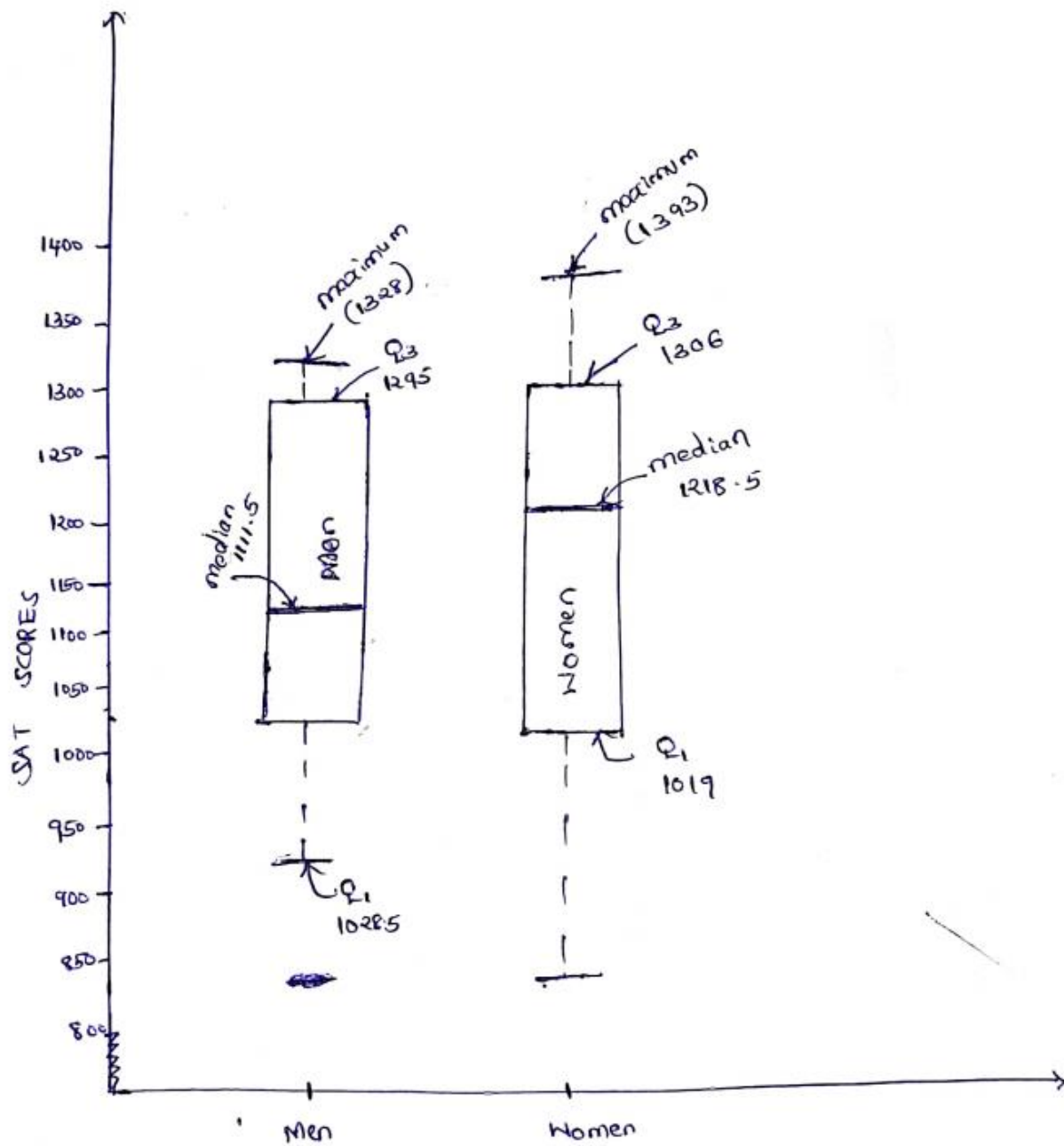
2: Maximum = 1393

3: Median = 1218.5

4: First quartile $Q1 = 1019$

5: Third Quartile $Q3 = 1306$

3. Sketch side-by-side boxplots for the sets of data.



4. Based on the 5-Number Summaries and the boxplots, which group had the highest median? Which group had the most consistent performance?

The group with highest median is SAT scores for women, they had a median of 1218.5 while SAT scores for men had a median of 1111.5. However, the group with most consistent performance are SAT scores for men because there is a small difference between the maximum and minimum value.

5. Compute the range and standard deviation for each set of data.

Range = Maximum – Minimum Value

$$\text{Standard Deviation (population)} = \sqrt{\frac{\sum_{i=1}^n (x_i - \text{mean})^2}{n}}$$

a. scores for men

$$\text{Range} = 1328 - 923 = 405$$

Standard deviation =

$$\sqrt{\frac{(1059-1136.7)^2 + (1328-1136.7)^2 + (1175-1136.7)^2 + (1123-1136.7)^2 + (923-1136.7)^2 + (1017-1136.7)^2 + (1214-1136.7)^2 + (1042-1136.7)^2 + (1313-1136.7)^2 + (1040-1136.7)^2 + (1100-1136.7)^2 + (1290-1136.7)^2 + (990-1136.7)^2 + (1300-1136.7)^2}{14}}$$

$$= 133.79$$

b. Scores of Women

$$\text{Range} = 1393 - 841 = 552$$

Standard deviation =

$$\sqrt{\frac{(1226-1165.3)^2 + (965-1165.3)^2 + (1053-1165.3)^2 + (1056-1165.3)^2 + (1393-1165.3)^2 + (1312-1165.3)^2 + (841-1165.3)^2 + (1222-1165.3)^2 + (1100-1165.3)^2 + (1215-1165.3)^2 + (1300-1165.3)^2 + (1296-1165.3)^2 + (985-1165.3)^2 + (1350-1165.3)^2}{14}}$$

$$= 166.11$$

6. Apply the range rule of thumb to estimate the standard deviation of each set of data. How well does it work in each case? Briefly comment on why it did or did not work in each case.

From range rule of thumb: Standard deviation = $\frac{Range}{4}$

- a. scores for men = $\frac{405}{4} = \mathbf{101.25}$
b. scores for women = $\frac{552}{4} = \mathbf{138}$

The range rule of thumb appears to be a form of estimating the standard deviation but not a form of determining the actual deviation. From given data, this rule of thumb does not seem to work at all in both cases. The estimates from the rule of thumb are far much less than the standard deviation calculated from the actual standard deviation formula. There is a lot of errors with the range rule of thumb.

7. Based on all your results, compare and discuss the two data sets in terms of their centers and variation.

The mean and median describe the centers of data while standard deviation and range describes how much the entire data sets spread from the centers of data. The mean for SAT scores for men is 1136.7 while the mean for SAT scores for Women is 1165.3. Since we have the same number of data set, the mean for SAT scores for women tells us that women scored more than men.

The median for Men is 1111.5 while that for women is 1218.5, this still shows that women scored more than men. When it comes to range, we will try to look at the difference between the maximum and minimum score, for the case of Men, the range is 405 while for Women, the range is 552. This tells us that there seem to be consistency in SAT scores for men than SAT scores for women because, a lower range means the sets of data are spread closely to each other while a bigger range tells us given set of data is widely spread.

Standard deviation tells us how much given data spreads from the mean value. The lower the standard deviation, the closer the data spreads from the mean and the higher the standard deviation, the wider the data spreads from mean value. SATs for men had standard deviation of 133.79 which is lower than SATs for women which had standard

deviation of 166.11. This shows that the SATs scores for men are spread closer to the mean thus showing some consistency while SATs for women are widely spread from the mean, thus shows some lack of consistency.