

## 4.3 AP HW (boxplots)

4.30 a

The ordered data is:

33, 41, 41, 42, 44, 44, 46, 46, 46, 46, 48, 50, 50, 51, 53, 53, 54, 55, 60

MIN

Q1

Q2

Q3

MAX

$N=19$

Q2 The median value is 46.

Q3 The upper quartile is 53.

Q1 The lower quartile is 44.

The interquartile range is  $53-44 = 9$ .

NO  
OUTLIERS

To check for mild outliers, we must compute  $1.5 \times 9 = 13.5$ . Are there any observations greater than  $53 + 13.5 = 66.5$ ? No. Are there any observations less than  $44 - 13.5 = 30.5$ ? No. There are no mild outliers, therefore there are no extreme outliers either.

4.35

The median score for Creamy is about 45 and the median score for Crunchy is about 51. The ranges appear to be equal. The data for Creamy is slightly skewed in the positive direction while the data for Crunchy is fairly symmetric.

4.36

For Type 1, the ordered data is 655.5, 679.1, 699.4, 721.4, 734.3, 788.3.

$$\text{The median} = \frac{699.4 + 721.4}{2} = 710.4$$

The lower quartile is 679.1.  $Q_1$

The upper quartile is 734.3.  $Q_3$

The interquartile range is 55.2

For Type 2, the ordered data is 686.1, 732.1, 772.5, 774.8, 786.9, 789.2.

$$\text{The median} = \frac{772.5 + 774.8}{2} = 773.65$$

The lower quartile is 732.1.  $Q_1$

The upper quartile is 786.9.  $Q_3$

The interquartile range is 54.8.

For Type 3, the ordered data is 639.0, 671.2, 696.3, 717.2, 727.1, 737.1.

$$\text{The median is } \frac{717.2 + 727.1}{2} = 722.15$$

The lower quartile is 671.2.  $Q_1$

The upper quartile is 727.1.  $Q_3$

The interquartile range is 55.9.

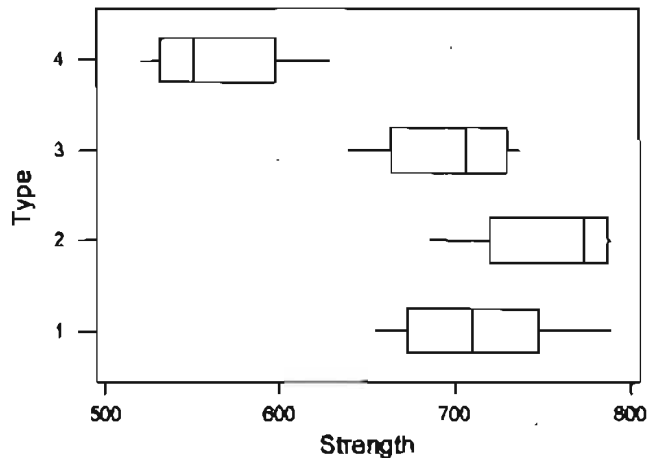
For Type 4, the ordered data is 520.0, 535.1, 542.4, 559.0, 586.9, 628.7.

$$\text{The median is } \frac{542.4 + 559.0}{2} = 550.7$$

The lower quartile is 535.1.  $Q_1$

The upper quartile is 586.9.  $Q_3$

The interquartile range is 51.8.



The median marker for Type 1 is centered in the boxplot whereas the medians for Type 2 and Type 3 are closer to the higher end of their boxplots and the median for Type 4 is closer to the lower end of its boxplot. The widths of the boxes are approximately equal indicating similar variability in the middle half of the data for each box type. There are no outliers for any of the different box types.

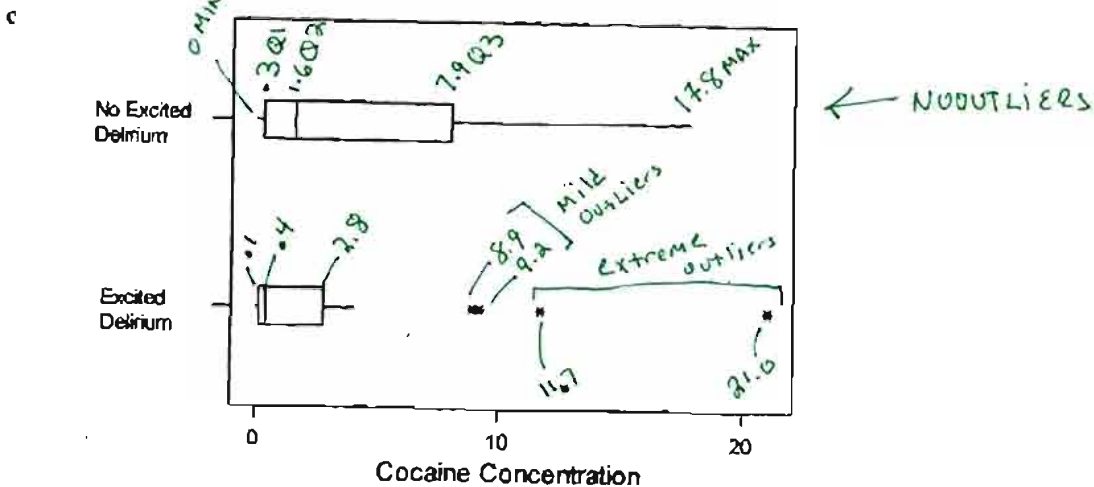
4.37

- a
- For the excited delirium sample, the median is 0.4. The lower quartile is 0.1 and the upper quartile is 2.8. The interquartile range is 2.7.  $N=27$
  - For the No Excited Delirium sample, the median is  $\frac{1.5+1.7}{2} = 1.6$ . The lower quartile is 0.3 and the upper quartile is 7.9. The interquartile range is 7.6.  $N=50$

- b
- To check for outliers for the Excited Delirium sample, we must compute  $1.5 \times 2.7 = 4.05$  and  $3 \times 2.7 = 8.1$
  - The lower quartile  $- 4.05 = 0.1 - 4.05 = -3.05$
  - The upper quartile  $+ 4.05 = 2.8 + 4.05 = 6.85$
  - The lower quartile  $- 8.1 = 0.1 - 8.1 = -8.0$
  - The upper quartile  $+ 8.1 = 2.8 + 8.1 = 10.9$
- So 8.9 and 9.2 are mild outliers and 11.7 and 21.0 are extreme outliers for the Excited Delirium sample.

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- To check for outliers for the No Excited Delirium sample, we must compute  $1.5 \times 7.6 = 11.4$  and  $3 \times 7.6 = 22.8$
- The lower quartile  $- 11.4 = 0.3 - 11.4 = -11.1$
- The upper quartile  $+ 11.4 = 7.9 + 11.4 = 19.3$
- There are no outliers for this sample.



The median marker for each boxplot is located at the lower end of the boxplot. The boxplot for the No Excited Delirium is much wider than for Excited Delirium indicating much more variability in the middle half of the data. Both boxplots have short whiskers on the lower end and long whiskers on the higher end. The Excited Delirium sample has 2 mild outliers and 2 extreme outliers. There are no outliers for the No Excited Delirium sample.