# Homework 2

## Problem 1

Below are the batting averages of 20 batting champions of the National League:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0.403 | 0.378 | 0.320 | 0.341 | 0.362 | 0.334 | 0.379 | 0.424 | 0.326 | 0.330 |
| 0.345 | 0.354 | 0.350 | 0.330 | 0.376 | 0.363 | 0.353 | 0.351 | 0.335 | 0.371 |

(a) Construct a relative frequency histogram for the data.

(b) What can you say about the shape of the histogram (modes, symmetry, outliers)?

(c) If you randomly selected one of the 20 players included in the set, what is the chance that the selected player's batting average was above 0.400 for his championship year?

## Problem 2

A set of 16 observations: 3, 5, 1, 2, 6, 1, 2, 3, 1, 7, 2, 0, 6, 2, 1, 1.

(a) Find the mean, median and mode.

(b) Compare the mean and the median. What does this suggest about the shape of the distribution?

## Problem 3

The weights of 10 cats (in pounds):

13.11, 8.69, 17.88, 16.15, 11.00, 14.22, 11.06, 14.19, 10.59, 9.76

(a) Find the mean and the median. How do they compare?

(b) Suppose a lion weighing 430.28 pounds is added to the group, so that now there are 11 observations. Find the mean and the median of the new data set. How do they compare?

(c) Explain the difference between the mean and median in part (b). Which is a better measure of center in that case?

**Problem 4**

A set of 5 observations: 2, 1, 1, 3, 5.

(a) Calculate the sample mean ($\bar{x}$).

(b) Calculate the sample variance ($s^2$) using the definition.

(c) Find the sample standard deviation ($s$).

(d) Find both $s^2$ and $s$ using the easier computing formula. Compare to parts (b) and (c).

(e) Suppose the sample comes from a population with $\mu = 3$ and $\sigma^2 = 1$. Find the z-score of each observation.

**Problem 5**

Construct a relative frequency histogram to desribe the following 50 measurements:

3.97, 7.44, 4.04, 6.60, 4.16, 3.14, 5.25, 4.63, 6.23, 1.17, 9.75, 7.44, 3.60, 4.29, 5.08, 3.92, 2.12, 5.31, 3.69, 2.78, 7.59, 4.02, 6.87, 5.28, 2.28, 8.26, 4.38, 5.14, 3.57, 2.44, 3.10, 5.01, 5.04, 8.14, 4.09, 4.43, 5.40, 6.84, 3.76, 4.34, 4.66, 6.44, 2.84, 4.99, 6.05, 4.17, 6.07, 2.70, 5.62, 5.16

**Problem 6**

A set of 10 observations: 5, 2, 3, 6, 1, 2, 4, 5, 1, 3.

(a) Find the range of the set.

(b) Use the range to estimate the standard deviation, $s$.

(c) Find the actual value of $s$. Compare to (b).

**Problem 7**

Suppose you have a set of $n$ observations with mean 10 and standard deviation 2. How would the mean and standard deviation change if

(a) Each observation is multiplied by 10?

(b) Each observation is decreased by 3 (subtract 3)?

(c) Each observation is multiplied by 10, then decreased by 3?

**Problem 8**

(a) Given $n = 10$, $\sum_{i=1}^{n} x_i^2 = 100$, and $\bar{x} = 1$, compute the sample standard deviation $s$.

(b) Given $n = 100$,$\sum_{i=1}^{n} x_i^2 = 10000$, and $\sum_{i=1}^{n} x_i = 1000$, compute the sample variance $s^2$.

### Problem 9

A set of 15 observations: 5, 2, 3, 6, 1, 2, 4, 5, 1, 13, 8, 7, 5, 1, 2.

(a) Compute the five number summary and find the $IQR$.

(b) Use the $IQR$ to check for outliers.

(c) Make a boxplot of the data and comment on what you see.

### Problem 10

Company 1 and Company 2 are competing businesses that both manufacture refreshing sugary beverages. Company 2 claims that its products contain less sugar than the competitor's. The table below contains amounts of sugar (in $g$) per $100ml$ for each company's 10 most popular products.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Company 1 | 10.6 | 11 | 8.2 | 7.6 | 9.1 | 5.3 | 11 | 11 | 8.4 | 9.5 |
| Company 2 | 8.4 | 6 | 7.2 | 7.1 | 8.4 | 5 | 6.5 | 7.2 | 8.4 | 7 |

(a) Make a boxplot for the measurements from Company 1. Comment on what you see.

(b) Make a boxplot for the measurements from Company 2. Comment on what you see.

(c) Compare the two boxplots. Do the plots support Company 2's claim?

### Textbook Problems

2.90, 2.92, 2.98, 2.112, 2.114