Statistics

Test 1

Form A

Spring 2016

Name: _____

Date: _____

READ THESE INSTRUCTIONS CAREFULLY!

- Circle or underline your final written answer.
- Justify your reasoning and show your work.
- If you run out of space, make a note and continue your work on the back of a page.

Statistics Facts

Probability

$$\begin{aligned} P(E) + P(\text{NOT } E) &= 1 \\ P(E \text{ OR } F) &= P(E) + P(F) - P(E \text{ AND } F) \\ P(E \text{ GIVEN } F) &= \frac{P(E \text{ AND } F)}{P(F)} \end{aligned}$$

Basic Parameters

Mean:

$$\begin{aligned} \mu &= \frac{1}{n}\sum_{i=1}^{n} x_i \\ &= \frac{x_1 + x_2 + \cdots + x_n}{n} \end{aligned}$$

Mean Deviation:

$$\begin{aligned} \text{MD} &= \frac{1}{n}\sum_{i=1}^{n} |x_i - \mu| \\ &= \frac{|x_1 - \mu| + \cdots + |x_n - \mu|}{n} \end{aligned}$$

Standard Deviation:

$$\begin{aligned} \sigma &= \sqrt{\frac{\sum_{i=1}^{n}(x_i - \mu)^2}{n-1}} \\ &= \sqrt{\frac{(x_1 - \mu)^2 + \cdots + (x_n - \mu)^2}{n-1}} \end{aligned}$$

Z-Score:

$$z = \frac{x - \mu}{\sigma}$$

1. (10 pts.) Find the mean of the following list of numbers.

$$2, 3, 5, 3, 3, 2, 1, 2$$

2. (10 pts.) Suppose we flip a coin three times in a row.

   (a) What is the sample space of this experiment?

   (b) What is the probability that we flip tails exactly twice?

3. (10 pts.) Find the mean deviation of the following list of numbers.

$$3, 7, 5, 5, 5, 6$$

4. (10 pts.) Find the standard deviation of the following list of numbers.

5, 15, 10, 6, 14

5. (10 pts.) Suppose we draw a single card from a standard 52-card deck. What is the probability that we draw either a diamond or a face card?

6. (10 pts.) Suppose we have collected the following list of numbers.

8, 11, 9, 6, 6, 7, 5, 6, 7, 8

Compute the z-scores of 4 and 14 with respect to this list.

7. (10 pts.) Suppose we roll two 6-sided dice, one red and one purple, whose faces are numbered from 1 to 6. What is the probability that we roll two numbers whose sum is exactly 11?

8. (10 pts.) Suppose we roll two 6-sided dice, one orange and one blue, with faces labeled 1 through 6. Compute the probability of the following events.

   (a) The dice show the same number.
   (b) The sum of the numbers on the dice is exactly 3.

9. (10 pts.) A survey was conducted to determine the study habits and final grades of statistics students. 248 stats students were asked whether or not they passed their stats class and whether they studied alone or with others. The results of the survey are collected in the following table.

	Pass	Fail
Study Alone	81	25
Study with Others	113	29

   Use this data to answer the following.

   (a) What is the probability that a randomly selected student passed statistics, given that they studied alone?
   (b) What is the probability that a randomly selected student studied alone, given that they passed statistics?

10. (10 pts.) Match each sampling method to its description.

____ Random Sampling

____ Simple Random Sampling

____ Convenience Sampling

____ Stratified Sampling

____ Cluster Sampling

____ Self-Selected Sampling

A. Divide the population into subpopulations, then choose *some* individuals from *all* subpopulations.

B. Allow individuals to choose whether or not to be in the sample.

C. Each subset of a given size has an equal chance of being selected.

D. Divide the population into subpopulations, then choose *all* individuals from *some* subpopulations.

E. Each individual has an equal chance of being selected.

F. Select individuals which are easy to find.