

Math 153 - Test 2a

March 21, 2013

Name _____

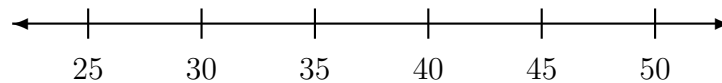
Score _____

Show all work to receive full credit. Supply explanations where necessary.

1. (10 points) The upper leg lengths, in centimeters, of 20 adult females are shown below.

| | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|
| 27.0 | 31.1 | 33.2 | 36.0 | 36.2 | 38.1 | 38.2 | 38.2 | 38.7 | 39.0 |
| 39.0 | 39.7 | 39.9 | 40.2 | 40.3 | 41.5 | 41.6 | 41.6 | 43.8 | 48.6 |

Determine the quartiles, the interquartile range, and the cutoff values for outliers. Then sketch the modified boxplot.



2. (6 points) Four letters are selected at random, without replacement, from the word *MISSISSIPPI*. What is the probability of spelling *MISS*?

3. (10 points) A number and a letter are simultaneously selected at random from each box.

| | | |
|---|---|---|
| 1 | 2 | 3 |
|---|---|---|

| | | |
|---|---|---|
| A | A | B |
|---|---|---|

- (a) What is the sample space for this experiment?
- (b) Is your sample space uniform (equally likely)? Explain.
- (c) What is the event of selecting the letter B from the second box?
- (d) Let Y be the event of selecting an odd number from the first box. What is \overline{Y} ?
- (e) With Y as defined above, let Z be the event of selecting the letter A from the second box. What is $Y \cap Z$?

4. (6 points) The five-number summary for a data set is:

$$\text{Min} = 14, \quad Q_1 = 37, \quad \text{Med} = 41, \quad Q_3 = 43, \quad \text{Max} = 50$$

What are the cutoff values for outliers? Does the data set have any outliers?

5. (7 points) A letter is selected at random from each box.

| | | | |
|---|---|---|---|
| A | B | C | C |
|---|---|---|---|

| | | |
|---|---|---|
| A | A | C |
|---|---|---|

| | | | | |
|---|---|---|---|---|
| A | A | A | B | C |
|---|---|---|---|---|

| | |
|---|---|
| A | B |
|---|---|

What is the probability that at least one letter A is selected?

6. (6 points) A card is drawn at random from a standard deck of playing cards. Let A be the event of drawing a face card, and let B be the event of drawing a queen. Compute $P(A|B)$ and $P(B|A)$. Be sure to indicate which is which.

7. (10 points) Suppose A and B are events such that $P(\overline{A}) = 0.25$, $P(B) = 0.5$, and $P(A \cup B) = 0.87$.

(a) Determine $P(A)$.

(b) Determine $P(A \cap B)$.

(c) Find the odds against B .

(d) Determine $P(A|B)$.

(e) Are A and B independent? Explain.

8. (9 points) A teacher collected the following data on her students.

| | Completed assignments | Did not complete assignments |
|---------------------|-----------------------|------------------------------|
| Passed class | 217 | 59 |
| Failed class | 18 | 67 |

A student is selected at random.

- (a) What is the probability that the student completed assignments?
- (b) What is the probability that the student failed the class?
- (c) What is the probability that the student completed assignments and passed the class?
- (d) What is the probability that the student passed the class given that the student completed assignments?
- (e) Are passing the class and completing assignments independent of one another? Show work or explain.

9. (12 points) Box One contains 5 blue marbles and 7 red marbles. Box Two contains 10 red marbles and 3 green marbles. A marble is selected at random from Box One and placed into Box Two. Then a marble is selected at random from Box Two.

(a) Sketch the complete tree diagram for this experiment. Include the probabilities of each path.

(b) What are the odds in favor of selecting a blue marble from Box Two?

(c) What is the probability of selecting a blue marble from Box One or a red marble from Box Two?

(d) What is the probability of selecting a blue marble from Box Two given that a red marble was selected from Box One?

10. (9 points) Three letters are selected, without replacement, from the English alphabet. Let x represent the number of vowels that are selected. The probability distribution for x is shown below.

| x | $P(x)$ |
|-----|----------------------|
| 0 | $\frac{7980}{15600}$ |
| 1 | $\frac{6300}{15600}$ |
| 2 | $\frac{1260}{15600}$ |
| 3 | $\frac{60}{15600}$ |

(a) How can you be certain that the table describes a probability distribution?

(b) What is the expected value of x ?

(c) Are there any unusually large or small values of x ?

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Show all work to receive full credit. Supply explanations where necessary. This portion of the test is worth 15 points and is due Monday, April 2. You must work individually on this test.

Two coins are selected at random (without replacement) from a jar containing 5 pennies, 4 nickels, and 2 quarters. Let x represent the total value, in cents, of the selected coins.

1. Thinking about this procedure as a two-stage experiment, sketch the probability tree. Include the probability of each path.

2. What are all the possible values of the random variable x .

3. Determine the probability distribution for x .

4. Find the mean (expected value) for x .

5. Find the variance and standard deviation.

6. Are any of the possible values for x unusually small or large? Explain.