Exam 1– STA 2023H – Spring 2016

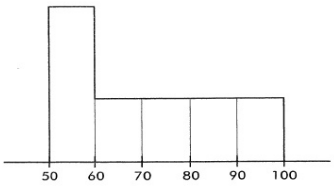
Directions: For the multiple choice part make sure you clearly label your answer. If you need extra space please use the extra blank sheet with appropriate labeling. Assume any mention of a cards is from a standard deck of cards.

1. Which of the following distributions are more likely to be skewed to the right than skewed to the left.

   I. Household incomes
   II. Home prices
   III. Age of teenage drivers

   (A) II. (B) I.and II. (C) I. and III. (D) II. and III. (E) I., II., and III.

2. Use the following histogram of test scores to answer which of the statements must be true.



   I. The median score is 75.
   II. If the passing score was 60, most students failed.
   III. More students scored between 50 and 60 than between 90 and 100.

   (A) I. (B) II. (C) III. (D) II. and III. (E) I., II., and III.

3. Suppose the score on a national test is 500 with a standard deviation of 100. If each score is increased by 25%, what are the new mean and new standard deviation, respectively?

   (A) 500, 100 (B) 525, 100 (C) 625, 100 (D) 625, 105 (E) 625, 125

4. A binomial random variable X counts the number of successes in 50 trials. If $\mu = E(x) = 20$, what is the probability of success?

   (A) 0.4 (B) 0.84 (C) 0.6 (D) 0.16 (E) not enough information

5. The dataset of water consumption for a small town in gallons per day is tabulated.What is the effect on the mean and standard deviation if consumption is increased by each individual in the dataset by 50 gallons per day.
   (A) The mean and standard deviation stay the same.
   (B) The mean remains the same while the standard deviation increases by $\sqrt{50}$.
   (C) The mean increases by 50 while the standard deviation remains the same.
   (D) The mean and standard deviation both increase by 50.
   (E) The mean increases by 50 while the standard deviation increases by $\sqrt{50}$.

6. Find the mean and median for the dataset

$$\{9, 7, 8, 6, 9, 12, 11, 5, 9, 10\}$$

(A) $\bar{x} = 8.6$, Median $= 9$ (B) $\bar{x} = 8.5$, Median $= 9$ (C) $\bar{x} = 8.6$, Median $= 8.5$
(D) $\bar{x} = 8.5$, Median $= 9.5$ (E) $\bar{x} = 8.0$, Median $= 9$

7. Individual outcomes of a random experiment are called

(A) random events (B) simple events (C) experimental results
(D) sample space (E) compound events

8. A sample space is

(A) the set of experimental events from a number of trials.
(B) the set of all events from a random experiment
(C) the set of all random events
(D) the set of all possible simple outcomes of a random experiment

9. Which of the following statements describe a probability

I. $0 \leq P(E) \leq 1$
II. The sum of the probabilities of all possible simple outcomes is 1.
III. The probability of an event is the ratio of successes to failures.

(A) I. (B) I. and III. (C) II. (D) I. and II. (E) III.

10. Suppose that X is a random variable for a binomial experiment that counts the number of success in 12 trials. Find $P(X \leq 3)$ if the probability of success for a single trial is 0.37.

(A) 0.135 (B) 0.295 (C) 0.2775 (D) 0.4765 (E) 0.5235

11. The probability of Bill serving an ace in tennis is 0.15, and the probability that he double faults is 0.25. What is the probability that Bill does not serve an ace nor a double fault.

(A) 0.5 (B) 0.15 (C) 0.4 (D) 0.9 (E) 0.6

12. In a statistics course, the probability that a randomly selected student has taken a calculus course is 0.48, while the probability that a randomly selected student drives to campus is 0.14. If the two events are independent, what is the probability that a randomly selected student in this course has taken a calculus course and drives to campus?

(A) 0.07 (B) 0.14 (C) 0.34 (D) 0.48 (E) 0.67

13. You flip a fair coin 100 times. What is the probability that you get between 45 and 55 heads (inclusive)?

    (A) .500 (B) .864 (C) .680 (D) .431 (E) .729

14. Choose the five number summary that matches this stem-and-leaf plot.

1	|	3789
2	|	049
3	|	399
4	|	00
5	|	1

    (A) Min: 13; Q1: 18; Med: 29; Q3: 39.5; Max: 51
    (B) Min: 13; Q1: 18.5; Med: 29; Q3: 39.5; Max: 51
    (C) Min: 13; Q1: 18.5; Med: 29.5; Q3: 39; Max: 51
    (D) Min: 13; Q1: 18.5; Med: 29; Q3: 39; Max: 51

15. Dr. McGovern takes note of the gas mileage of his 13 year old car every time he fills up. Here is the data for the number of miles per gallon taken over the last year. The data have been loaded into an excel worksheet called MPG that you should have received via an email.

    i) In the space on this page below create a stem-and-leaf plot with the leafs as tenths of a unit.

    ii) On the excel worksheet MPG create bins titled, 17, 18, 19, 20, 21. Tally up the bins appropriately in Column G.

    iii) In the worksheet MPG create a histogram for the bins and data.

    iv) On the same worksheet in Column B next to cell give the sample size, median, mean, standard deviation, and variance.

    v) If you are to select one of these data points at random, what is the probability that one of the three digits of the number is an even number or the decimal digit (the tenths) is an odd?

19.8 21.8 20.9 18.0 18.9 18.1 17.4 20.5 19.3 19.5 18.3 19.0 19.6 18.5 18.7 20.3

19.6 21.1 21.1 20.2 20.3 19.6 20.3 20.7 20.5 18.6 20.3 19.1 18.1 18.3 20.9 18.2

16. **Extra Credit** State the formula for the standard deviation for a dataset $\{x_i\}_{i=1}^n$.

17. How many ways are there of permuting n objects?

18. The measure of center that is most resistant to extreme values is _____.

19. What must be true about the data point x for it to be called an *outlier*?

20. What does it mean for the events A and B to be *mutually exclusive*?

21. What does it mean for the events A and B to be *independent*?

22. Consider a binomial experiment that has n-many trials and the probability of success of one trial is p. Letting X be the number of successes what is the formula for the probability of exactly k successes. How would you find this using your calculator?

23. Give an example of each of the following:
    1) categorical data:

    2) quantitative data that is discrete:

    3) quantitative data that is continuous:

24. How many 5 card poker hands are there?

25. How many three-of-a-kinds in a 5 card poker hand are there?

26. A *flush* is a 5 card poker hand where all five cards are of the same suit. How many flushes are there? (I am fine with you counting straight flushes and royal flushes in this group.)