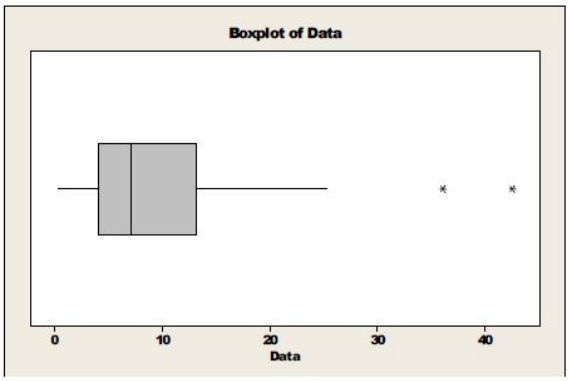
STAT 2507
SAMPLE MIDTERM TEST
FALL 2014

Note: The sample midterm test does NOT predict the size and content of the actual midterm test. Also note some answers are rounded off.

Please circle one answer only.

The first two questions are based on the following boxplot.



1. Which one of the following statements about the distribution above is correct:

   (a) Symmetric and has no outlier.
   (b) Skewed to the left and has outliers(s).
   (c) Skewed to the right and has outlier(s).
   (d) Symmetric but the mean and the median are different.

2. Which one of the following statements is false?

   (a) The mean is larger than the median.
   (b) The median is approximately equal 7.
   (c) The maximum value is approximately 43.
   (d) The maximum value is approximately 25.

3. The following data represent a sample of 10 scores on a statistics quiz:

   21 21 21 21 21 23 23 25 25 25

   After the mean, median, range and variance were calculated for the scores, it was discovered that one of the three 25's should have been a 23. Which of the following will change when the calculations are redone using the correct scores?

   (a) Both mean and range.
   (b) Only the median.
   (c) Both variance and range.
   (d) Both mean and variance.

4. Suppose you roll a pair of fair dice. What is the probability that the number of dots on the two dice sum to either 5 or 10?

   (a) 5/36 **(b)** 7/36 **(c)** 11/36 **(d)** 4/36

5. Suppose that $P(A) = 0.4$, $P(B) = 0.3$, and $P(A \cap B) = 0$. Which one of the following statements correctly defines the relationship between the events A and B?

   (a) The events A and B are independent, but not mutually exclusive.
   (b) The events A and B are mutually exclusive, but not independent.
   (c) The events A and B are neither mutually exclusive nor independent.
   (d) The events A and B are both mutually exclusive and independent.

6. During a particular period a university's information technology office received 25 service orders for problems with printers, of which 5 were inkjet printers and 20 were laser models. A random sample of 4 of these service orders is selected for inclusion in a customer satisfactory survey. What is the probability that exactly 3 of the selected service orders were for inkjet printers?

   (a) $\frac{C_3^5 C_1^{20}}{C_5^{25}}$ **(b)** $\frac{C_3^5 C_2^{20}}{C_5^{25}}$ **(c)** $\frac{C_1^5 C_3^{20}}{C_4^{25}}$ **(d)** $\frac{C_3^5 C_1^{20}}{C_4^{25}}$

7. According to a survey of adults, 64% have money in a regular savings account. If we plan on surveying 50 randomly selected adults, find the mean number of adults who would have regular savings accounts.

   (a) 12 **(b)** 22 **(c)** 32 **(d)** 42

8. Suppose an experiment involving five subjects is conducted to determine the relationship between the percentage of a certain drug in the bloodstream and the length of time it takes to react to a stimulus. The results are shown in the table below.

Reaction Time versus Drug Percentage

Subject	Percent x of Drug	Reaction Time y (seconds)
1	1	1
2	2	1
3	3	2
4	4	2
5	5	4

   Using the fact that $\sum x_i = 15$, $\sum y_i = 10$, $\sum x_i^2 = 55$, $\sum y_i^2 = 26$, and $\sum x_i y_i = 37$, find the correlation coefficient for the reaction time, y, and the amount of drug in the bloodstream, x, and decide what is the relationship (if any) between x and y.

   (a) There is a strong negative linear relationship between x and y.
   (b) There is a strong positive linear relationship between x and y.
   (c) There is a weak positive linear relationship between x and y.
   (d) There is no linear relationship between x and y.

9. Thirty students in a experimental psychology class use various techniques to train a rat to move through a maze. At the end of the course, each student's rat is timed as it negotiates the maze. The sample mean and the sample standard deviation of times of 30 rats running through a maze (in minutes) were found to be $\bar{x} = 3.74$ and $s = 2.20$. Using Chebyshev's inequality, at least how many of the 30 running times will fall in the interval $(-0.66, 8.14)$?

(a) at least 22 **(b)** at least 23 **(c)** at least 8 **(d)** at least 11

10. If 5% of men and 0.25% of women are colour blind, what is the probability that a randomly selected person is colour blind? We assume that it is equally likely that a selected person will be a man or a woman.

(a) 0.731 **(b)** 0.143 **(c)** 0.189 **(d)** 0.026

11. Suppose that in a particular city, airport A handles 40% of all airline traffic, and airports B and C handle 40% and 20%, respectively. The detection rates for weapons at the three airports are 0.9, 0.5, and 0.4, respectively. If a passenger is found to be carrying a weapon, what is the probability that he is using airport A?

(a) 0.64 **(b)** 0.56 **(c)** 0.89 **(d)** 0.67

12. A salesman of small-business computer systems will contact three customers during a week. Each contact can result in either a sale, with probability 0.3, or no sale, with probability 0.7. Assume that customer contacts are independent. If X denotes the number of computer systems sold during the week, then the probability $P(X = 1)$ equals

(a) 0.784 **(b)** 0.441 **(c)** 0.216 **(d)** 0.528

13. Refer to the previous question. What is the value of $E(2X + 1)$?

(a) 2.6 **(b)** 3.8 **(c)** 2.8 **(d)** 4.0

14. For the probability distribution of a discrete random variable X, the probability of any single value of X is always

(a) in the range 0 to 1
(b) equal to 1
(c) less than zero
(d) greater than 1