Stat 3115D - Exam 1

Name: _____

Instructions:

- Do not open the exam until I say you may.

- Circle or box your final answer where appropriate.

- All work must clearly and legibly support your answer. Failure to show work sufficient to support your answer will result in the loss of points, even with the correct answer.

- If you run out of room, use the back of the page and indicate this on the question.

- As always, you are expected to exhibit academic integrity during the exam.

Materials Allowed:

- One calculator than cannot communicate with other devices. You may not share calculators during the exam.

Page:	1	2	3	4	5	6	Total
Points:	15	20	17	14	16	18	100
Score:							

1. (6 points) Circle the correct answer. Each part is worth two points.

   (a) True or False : A sample of 1000 college students is selected from all students registered at a certain college, and it turns out that 330 of them participate in intramural sports. We can conclude that the proportion of students at this college who participate in intramural sports is *exactly* 0.33.

   (b) True or False : The unit for the standard deviation is the same as the unit for the data values.

   (c) True or False : For any group of numbers, half of them will be below the mean.

2. (9 points) Circle the correct answer. Each part is worth three points.

   (a) During a particularly cold winter, the temperature stayed below zero for ten straight days (ranging from -20 to -5). The variance of this ten-day period:

   　　　A. is negative since all the numbers are negative.

   　　　B. must be at least zero.

   　　　C. cannot be computed since all the numbers are negative.

   　　　D. can either be positive or negative.

   　　　E. is impossible to determine with the given information.

   (b) Which of the following statements regarding histograms are correct?

   　　　A. A unimodal histogram is one that rises to a single peak and then declines, whereas a bimodal histogram is one that has two different peaks.

   　　　B. A histogram is symmetric if the left half is a mirror image of the right half.

   　　　C. A unimodal histogram is skewed if the right or upper tail is stretched out compared to the left or lower tail.

   　　　D. All of the above.

   　　　E. Only (A) and (B), not (C).

   (c) Which of the following can be inferred from a boxplot?

   　　　A. Mean

   　　　B. Variance

   　　　C. Median

   　　　D. All of the above.

   　　　E. None of the above.

3. A study was conducted on S&T's campus to determine the preferred temperature (degrees Fahrenheit) that employees and students said described their ideal weather. Researchers collected the following information from a sample of 20 employees and students: preferred temperature (degrees Fahrenheit), state or country of origin, and age (in years).

(a) (4 points) State the variables measured and whether they are categorical (C) or quantitative (Q).

(b) The following table gives the preferred temperature (degrees) for the 20 employees/students.

41	45	50	57	57	58	58	62	63	64
65	65	67	68	69	71	73	74	79	88

Calculate the following by hand. You *must* show work. Failure to do so will result in zero points.

(a) (3 points) Mean

(b) (2 points) Median

(c) (3 points) Lower quartile (Q1)

(d) (3 points) Upper quartile (Q3)

(e) (5 points) Are there any outliers?

4. A study was conducted at the Giddy Goat to investigate consumer buying habits. The following table gives data on the type of coffee that was purchased for 100 customers.

	Small	Medium	Large
Regular	15	20	25
Decaf	26	12	2

(a) (4 points) Calculate the probability that a randomly selected customer orders a large coffee.

(b) (4 points) Calculate the probability that a randomly selected customer orders a large regular coffee.

(c) (4 points) Given that a customer orders a large, what is the probability that the customer orders a regular?

(d) (5 points) Are the events ordering a regular and ordering a large coffee independent? Show work to justify your answer.

5. In a certain state, license plates consist of three capital letters (A-Z) followed by three numbers (0-9).

    (a) (5 points) How many *possible* different license plates can be made?

    (b) (5 points) How many license plates can be made if we require no letter or number appears more than once?

    (c) (4 points) What is the probability that a randomly chosen license has no letter or number that appears more than once?

6. It is known that 1 in 100 people will develop some form of melanoma (skin cancer) in their lifetime. A new high-accuracy diagnostic tool is being tested. Of those with melanoma, 98% of them will have a positive result; those without melanoma will test positive only 0.1% of the time. You are chosen as a subject for the diagnostic test.

   (a) (5 points) Calculate the probability that you have melanoma and test positive.

   (b) (6 points) Calculate the probability that the test is positive.

   (c) (5 points) Your test result is positive. What is the probabiliy that you have melanoma?

7. The three most popular options on apartments in Rolla are a garage (A), a dishwasher (B), and a laundry machine (C). You are given the following information about the preferences of the renters.

   - 30% request A, 55% request B, and 45% request C.
   - 25% request both A and B, 25% request both A and C, and 35% request both B and C.
   - 20% request all three.

   (a) (8 points) Fill out the completed Venn Diagram for this problem.

   (b) (4 points) Calculate the probability that the next renter will request exactly one of these three options.

   (c) (6 points) Given that the renter requests a garage (A), what is the probability that the renter will request a dishwaser (B), washing machine (C) or both?