STA 100
Fall Quarter, 2017
Exam I

Name: _____
Student ID: _____

1. *Round to four decimal places.*
2. *A correct answer with no work shown will not receive full credit.*
3. *An incorrect answer with no work shown (for example, via calculator)* ***will receive no credit****.*
4. *Please make sure to write your name on* ***all*** *of the exam pages (in the upper right corner.)*

Good Luck!

Name: _____

True/False

For each of the following questions indicate true or false, then **explain** your answer. You may use examples to illustrate your answer.

(I) The minimum possible value that Y can take on where Y is a binomial random variable is the value 0.

(II) For two events A and B (where $Pr\{A\} > 0, Pr\{B\} > 0$), the following equation holds true: $Pr\{A|B\} = Pr\{B|A\}$.

(III) For a sample dataset, it is not possible for the first quartile to equal the median.

(IV) For a normal random variable Y with mean μ_Y and standard deviation σ_Y, $Pr\{Y > \mu_Y\} = Pr\{Y < \mu_Y\}$.

Name: _____

Full Detail

Work out the following problems. **Show your work.**

1. Body mass index (BMI) is a measure of how fit a person is, and is given in units of kg/m^2. BMI for all people in a certain state in the US is believed to be normally distributed, with population mean 25.44, and population standard deviation 4.88. Use this information to complete the following problems.

   (a) Find the probability that a randomly selected subject has a BMI over 23.

   (b) If a randomly selected subject has a BMI under 25.44, what is the probability that their BMI is over 20?

   (c) Suppose subjects in the top 25% of the distribution are considered to be "overweight". What is the cutoff for a subject being considered "overweight"?

   (d) If we randomly sample six subjects, what is the probability that exactly four of them are "overweight"?

Name: _____

2. For a certain group of people, the probability they have a specific disease allele is 0.50. If they have this allele, the probability of developing kidney cancer is 0.30. If they do not have this gene, the probability of developing kidney cancer is 0.016. Assume a person was randomly selected from this group.

   (a) Find the probability that they develop kidney cancer.

   (b) Find the probability that if they developed kidney cancer, they have the gene.

   (c) Find the probability that they either develop kidney cancer, had the gene, or both (the union).

   (d) Find the probability that if they do not develop kidney cancer, they have the gene.

Name: _____

3. Suppose a random sample of the starting salaries (in thousands of dollars) for 9 veterinarians that have recently completed veterinarian school is:

$$42, 59, 67, 68, 72, 79, 81, 82, 112$$

(a) Calculate the first quartile, the third quartile, and the median.

(b) Identify any outliers, being sure to show all your work.

(c) Find the sample mean. Would you suggest using the sample mean or median to describe the center of the data? Explain.

(d) If the sample standard deviation is $s = 19.10$, what proportion of the data lies within 1 sample standard deviation from the sample mean?