

Fall 2019 MSCR 500 Quiz 1

Student Name: _____

Read the following carefully before beginning...

- **You must work completely on your own. You may not receive assistance from anyone except the course instructor. You may not give assistance to anyone.**
- **While working on this quiz, you may not communicate with anyone, in any manner, direct or indirect, except for the course instructor.**
- **Either:**
 - Print this quiz out, write your answers on it, and then scan and email your quiz to anizam@emory.edu and myu56@emory.edu, or
 - Type your answers into this Word document, save and email to anizam@emory.edu and myu56@emory.edu
 - **Make sure your full name is in the name of the file that you email, and also on this cover page.**
- This is an open-notes and open-book quiz. You may also use any materials posted on our Canvas site.
- You may use a scientific calculator (or calculator app on your phone/tablet)
- Do not use SAS or any other statistical/mathematical software.
- In order to maximize your chances of getting partial credit, show all work on problems that require calculations to be performed. Clearly show formulas that you are using, and identify values that are being “plugged” in.
- On probability problems, clearly identify any rules you are using. Also, be sure to clearly and fully justify the use of any probability distributions (e.g., “the population is known to be normal, and the population variance is unknown, and $n=xx$ so this inference on the population mean can be performed using the t distribution with $xx - 1$ degrees of freedom”)
- Use only the tables in the Weiss text for normal or t distribution probability look-ups. Do not use tables from any other source, or any software/apps for this purpose.
- Good luck!

Allow yourself no more than 1 hour and 50 minutes to complete the quiz. Email your quiz to the addresses mentioned above before 11:59pm on Friday, 10/25.

There are 5 pages in this quiz.

Q.1 Read the information on page 1 of the New England Journal of Medicine article that was provided with this quiz, and also take a look at Tables 1 and 2 from that article. Then answer the questions below. Circle the best answer for each of these questions.

- a) The 451 patients in the study can be thought of as
- A. the population of interest.
 - B. patients sampled from the population of interest.
 - C. random patients, not necessarily from any particular population.
- b) The statistics shown in the main body of Table 1
- A. describe the baseline characteristics of the samples of patients in the study.
 - B. describe the baseline characteristics of the population of patients of interest in the study.
 - C. represent a complete and final set of inferential statistical results that allow us to generalize from the sample and make inferences about the population.
- c) In Table 1, the ‘Symptomatic Qualifying Artery’ variable would best be described as
- A. Nominal
 - B. Ordinal
 - C. Continuous
 - D. Discrete
- d) In Table 1, the ‘History of Smoking’ variable would best be described as
- A. Nominal
 - B. Ordinal
 - C. Continuous
 - D. Discrete
- e) In the study, the vast majority of patients were randomized within a day or two of experiencing symptoms of a stroke (i.e, a “qualifying event”). In Table 1, the distribution of the ‘Time from qualifying event to randomization’ variable is
- A. Probably left-skewed
 - B. Probably right-skewed
 - C. Probably symmetric
 - D. Normal
- f) True or False: Based on the results in Table 2, the sample coefficient of variation for the average systolic blood pressure at four months is larger in the PTAS group than in the Medical Management Group.
- True False

Q.2 According to the Arizona Chapter of the American Lung Association, 7% of the population has lung disease. Of those having lung disease, 10% are non-smokers. Of those not having lung disease, 74.7% are non-smokers. Suppose that one person is selected at random. Let A and B be two events defined as follows:

A: Person has lung disease

B: Person is a non-smoker

a) The probability that the person has lung disease (rounded to 2 decimal places) is:

b) $\Pr(B|A)$ (rounded to 2 decimal places) is:

c) $\Pr(B|A^c)$ (rounded to 3 decimal places) is:

d) The probability that the person has lung disease and is a non-smoker (rounded to 4 decimal places), is:

e) The probability that the person does not have lung disease and is a non-smoker (rounded to 4 decimal places), is:

f) The probability that the person is a non-smoker (rounded to 2 decimal places) is:

Q. 3 The following letter appeared in a well-known newspaper advice column in 1978:

“Dear Abby: You wrote in your column that a woman is pregnant for 266 days. Who said so? I carried my baby for [310] days, and there is no doubt about it because I know the exact date my baby was conceived. My husband is in the Navy and it couldn’t have possibly been conceived any other time because I saw him only once for an hour, and I didn’t see him again until the day before the baby was born.

I don’t drink or run around, and there is no way this baby isn’t his, so please print a retraction about the 266-day carrying time, because otherwise I am in a lot of trouble.”

- a) Suppose that carrying times are normally distributed with mean 266 days and standard deviation 16 days. Find the probability that the carrying time will be 310 days or more for a randomly chosen pregnant woman.
- b) Assuming that the norms in (a) are correct and keeping in mind your answer in (a), do you think the woman is “in a lot of trouble” or not? Briefly but clearly, explain.

Q. 4

Nationwide, background radiation levels are known to be normally distributed, with mean 0.4 rem and standard deviation 0.05 rem.

Suppose that the nuclear regulatory agency requires that alerts be issued if the radiation level within 50 miles of a nuclear power plant exceeds the 95th percentile of background radiation levels.

- a) What is the 95th percentile of background radiation levels?
- b) The radiation level is measured at 100 locations within a fifty-mile radius of the Brightglow nuclear power plant. The mean of the 100 sampled values is 0.42 rem, with sample standard deviation 0.05 rem. Find a 95% confidence interval for the true average radiation level near Brightglow.
- c) Based on the confidence interval in (b), should alerts be issued? Briefly, explain.