

MIDTERM EXAM

October 20th, 1997

Answer each of the questions in the exam books provided. There are 75 total points. Read the questions carefully and keep your answers *brief and to the point*. PLEASE WRITE NEATLY. Good luck!

Question 1. [10 points]

A sample of 50 motorists was taken on a Federal Highway where the speed limit was 55 miles per hour. The data are shown below.

56	50	48
51	54	51
52	63	55
67	53	53
55	54	54
69	61	56
67	55	58
58	54	55
64	60	56
70	57	56
57	58	57
53	52	58
59	59	55
60	55	59
63	53	46
65	54	54
55	52	

- (3 points) Produce a dot plot of the motorists' speed.
- (4 points) Calculate the mean, the median, and the mode in this sample.
- (3 points) Just by looking at the mean and the median, can you say something about the shape of the distribution? Comment.

Question 2. [5 points]

A sociologist recently conducted a survey of citizens over 60 years of age whose net worth is too high to qualify for Medicaid but who have no private health insurance. The ages of 25 uninsured senior citizens were as follows:

68 73 66 76 86 74 61 89 65 90 69 92
 76 62 81 63 68 81 70 73 60 87 75 64 82

Find the lower quartile of the data. Please explain how you get it.

Question 3. [10 points]

A radio station claims that the amount of advertising per hour of broadcast time has an average of 3 minutes and a standard deviation equal to 2.1 minutes. You listen to the radio station for one hour, at a randomly selected time, and carefully observe that the amount of advertising time is equal to 7 minutes.

Based on your observation, what would you infer about the radio station's claim?

Question 4. [20 points]

The managers of a Fortune 500 company were surveyed to determine the background that leads to a successful manager. Each manager was rated as being either a good, fair, or poor manager by his/her boss. The manager's educational background was also noted. The data appear below.

Manager Rating	High School Degree	Some College	College Degree	Master's or Ph.D.	TOTALS
Good	2	3	22	12	39
Fair	5	15	45	22	87
Poor	3	8	9	14	34
TOTALS	10	26	76	48	160

- (4 points)* What proportion of the managers had earned at least one college degree?
- (4 points)* If we randomly selected one manager from this company, find the probability that he/she has an advanced (Master's or Ph.D.) degree and is a good manager.
- (4 points)* Given that the manager is only a fair manager, what is the probability that this manager has no college background?
- (4 points)* What proportion of the managers are either good or advanced degree recipients?
- (4 points)* What commands would you give in SAS to reproduce such a table, including relative frequencies and row/column percentages?

Question 5. [10 points]

A manufacturer of 35-mm cameras knows that a shipment of 30 cameras sent to a large discount store contains 8 defective cameras. The manufacturer also knows that the store will choose 2 of the cameras at random, test them, and accept the shipment if neither is defective.

- (a) (5 points) What is the probability that both the cameras selected are defective?
- (b) (5 points) What is the probability that the shipment is not accepted?

Question 6. [10 points]

Suppose that 4 out of 20 liver transplants done at a hospital will fail within a year. Consider a random sample of 3 of these 20 patients.

- (a) (4 points) What is the probability that all three patients will result in failed transplants?
- (b) (4 points) What is the probability that at least one of the three patients results in a failed transplant?
- (c) (2 points) Define the random variable that describes this experiment, and say what type of distribution it follows.

Question 7. [10 points]

We believe that 90 % of all Statistics students at NYU (in the Fall 97 course) consider statistics a very exciting subject, that will change their lives. Suppose we randomly and independently selected 20 students from the population.

- (a) (5 points) How many of the sampled students do we expect to consider statistics a very exciting subject?
- (b) (5 points) What variance do we expect in the sample?

Question 8. [10 points] - (EXTRA-CREDIT: Do this only if you have time)

A county welfare agency employs 25 welfare workers who interview prospective food stamp recipients. Periodically, the supervisor selects, at random, the forms completed by two workers to audit for illegal deductions. Unknown to the supervisor, 6 of the workers have regularly been giving illegal deductions to applicants.

What is the probability that neither worker chosen has been giving illegal deductions?