MATH 210 - Test #2 - 3/20/00 _____

Points in [brackets] sum to 103. ***Show all work for full credit!***

1. An insurance company sells a life insurance policy to a 21-year-old male. A premium of $250 is paid each year. If the policy holder dies prior to age 26 his estate is paid $100,000; otherwise the insurance company keeps the $1250 as their profit. The following table describes the profit for the insurance company depending on when the policyholder dies and gives probabilities for the age of death of a male who has just turned 21.

Age of Death	21	22	23	24	25	26 or older
Profit (X)	!$99,750	!$99,500	!$99,250	!$99,000	!$98,750	$1250
Probability (P)	0.001	0.001	0.002	0.002	0.002	

a. According to this table what is the probability that a male who just turned 21 will die before they turn 24?
[4]

b. What is the probability that a male who just turned 21 will die when they are 26 or older?
[4]

c. What is the company's *expected profit* per policy sold? (i.e., what is their mean profit per policy?)
[8]

d. Should the company feel good about selling this policy? **Why or why not?**
[4]

e. Would you personally be willing to sell this policy to a friend? **Why or why not?** (Think about the short-term versus the long-term.)
[4]

f. For the next 30 men who buy the policy, what is the probability that *none of them* die prior to age 26?
[4]

2. Based on past observation I have noted that only 40 percent of students attend class the day before Spring Break. There are 10 students in my Survey of Math class. We are interested in describing the number of students who actually attend on the day before break

a. Show how this can be set up as a binomial experiment by defining the following components. Give *specific values* for *n* and *p* and a *description* for SUCCESS and *X*. **These must be defined *in the context of this problem*.**

[8]

n =

SUCCESS is ...

X represents ...

p =

b. What is the average number in attendance in my Survey class?

[3]

c. From year to year, what is the standard deviation in the number attending?

[3]

d. What is the probability that there will be at least 6 students in attendance?

[5]

e. An Intro to Statistics class has 30 students. What is the probability that there will be at least 18 students in attendance? **Justify the validity of the method you use!**

[10]

3. The following two-way table gives a breakdown by sex and class for the 976 full-time, undergraduate students enrolled at Manchester in Fall 1998. (1999–2000 M.C. catalog)

[15]

	FY	SO	JR	SR	Total
MALE	159	120	89	97	465
FEMALE	184	127	95	105	511
Total	343	247	184	202	976

You plan to choose a student "at random." (i.e., in a fair draw).

a. What is the probability the student chosen is a female?

b. What is the probability the student chosen is a sophomore (SO)?

c. What is the probability that the student chosen is a female sophomore?

d. Suppose you are told the student chosen is female. What is the probability she is a sophomore? That is, find P(SO *given* FEMALE).

e. **Explain** whether the events FEMALE and SO are *independent*. Your answer should be based on the numerical results from the previous parts.

4. Suppose you know that the amount of time M.C. students sleep on school nights is normally distributed with a mean of 6 hours with a standard deviation of 1 hour.

   a. If you choose an SRS of 16 students what is the probability that the mean for your sample will be between 5.75 and 6.25 hours? (**Be sure to justify the appropriateness of the method you use.)**

[10]

   b. Suppose you did not know that study times follow a normal distribution. Would this affect your ability to answer question (a)? **Explain!**

[3]

2. Miscellaneous

   a. The mean roll on a fair, six-sided die is 3.5. What does the "Law of Large Numbers" tell us about mean roll for a sample of *n* observations?

[4]

   b. Two events are called _____ if they have no outcomes in common.

[2]

   c. A key aspect of inferential statistics is using a sample _____ to make a numerical estimate of the corresponding population _____ .

[4]

   d. Describe the complement of the event that "no one came to class today."

[3]

   e. Suppose weights of men in a given population are *uniformly* distributed from 120 and 240 pounds. What can be said about the percentage of men weighing between 210 and 240 compared to the percentage weighing between 175 and 185? **Explain!**

[4]