MATH 333: Probability & Statistics. **Examination #1** **(Spring 2005)**

February 23, 2005 (A) **NJIT**

Name:	**SSN:**	**Section #**

Instructors **: A. Jain, H. Khan, K. Rappaport**

➔ **Must show all work to receive full credit.**

I pledge my honor that I have abided by the Honor System. ______________________________
(Signature)

Score	
#1	
# 2	
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#5	
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Total	

1. At a certain gas station, 55% of the customers buy regular unleaded gas, 25% buy extra unleaded gas, and 20% buy premium unleaded gas. Of those customers buying regular gas, 30% fill their tanks. Of those customers buying extra gas, 60% fill their tanks, whereas of those buying premium, 50% fill their tanks.

   a. What is the probability that the next customer fills the tank? (8 pts)
   b. If the next customer fills the tank, what is the probability that this customer buys regular gas? (8 pts)

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2. A sample of 24 offshore oil workers took part in a simulated escape exercise, resulting in the following data on time (seconds) to complete the escape:

373	370	364	366	364	301	339	393
356	359	363	375	454	325	394	402
392	368	374	359	356	403	334	397

a. Construct a stem-and-leaf display of the above data. Without doing a calculation, how do you think that the mean and median will compare? (6 pts)
b. What can you say about the shape of the distribution of escape times? (6 pts)
c. Compute the median escape time. By how much could the largest time, 454 seconds, be increased without affecting the value of the sample median? By how much could this value be decreased without affecting the value of the sample median? (6 pts)

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3. Use the simulated escape data given in Problem #2 to prepare a box plot.
   a. Show all your steps such as the computation of the median, lower and upper quartiles, and inter-quartile range. (5 pts)
   b. Are there any outliers in your box plot? (5 pts)
   c. Find the sample mean and standard deviation of escape times. [Hint: the sum of the 24 escape data values is 8,881 and the sum of squares is 3,307,695] (5 pts)

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4. Seventy percent of all vehicles examined at a certain emissions inspection station pass the inspection. Assume that successive vehicles pass or fail independently of one another. Compute the following probabilities for the next three vehicles inspected: (5 pts each)

a. P(all three pass)
b. P(at least one of the three fail)
c. P(exactly one of the three passes)
d. P(at most one of the three passes)

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5. One box contains 5 red balls and 7 green balls and a second box contains 8 red balls and 6 green balls. A ball is randomly chosen from the first box and placed in the second box. Then a ball is chosen at random from the second box and placed in the first box.

a. What is the probability that a green ball is chosen from the first box and a green ball is chosen from the second box? (8 pts)
b. At the end of the process of choosing and placing balls, what is the probability that the numbers of red and green balls in the first box are identical to the numbers at the beginning? (8 pts)

6. Suppose a tour company has 20 buses and 8 of them have seat belts for all passengers.

   a. In how many ways can you choose a sample of 6 buses at random from 20 buses for use on a particular day? (5 pts)
   b. In how many ways can you choose a random sample of 6 buses such that 3 of them have seat belts? (5 pts)
   c. If a random sample of 6 buses is chosen, what is the probability that 3 of them will have seat belts? (5 pts)

$\boxed{\textbf{END}}$