MATH 333: Probability & Statistics. Final Exam,   Spring 2002   Scores

May 15, 2002   NJIT

Name:	SSN:	Section #

Instructors: **S. Balaji, M. C. Bhattacharjee, S. Dhar, H. Fanik N. Moheb**

#1	
# 2	
#3	
#4	
#5	
#6	
Total	

Must show all work to receive full credit.

On my honor, I pledge that I have not violated the NJIT Student Honor Code. _____
(Signature)

1. The following are the summary statistics of scores in Common Exam #2, for two sections (sections A and B) of "Math 333- Probability and Statistics" during a semester.

	Sample Size	Sample mean	Sample Standard deviation
Section A	31	59.4	17.7
Section B	32	68.4	19.3

Assuming that the students of the two sections are random samples from two independent groups:

(i) (**7 points**) find a 95% confidence interval for the difference in their true means.

(ii) (**9 points**) does the data suggest that the true mean scores of the two groups are different at 5% level of significance? Also, find the P-value.

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2. A manufacturer of a generic brand batteries claims that the average lifetime is at least 23.5 hours. A consumer's group wants to challenge this claim. They randomly tested 25 batteries and found that the average lifetime of their sample was 22.25 hours with a standard deviation of 4 hours. Assuming that the lifetime of the batteries is normally distributed:

(i) (**9 points**) can you conclude that the manufacturer's claim is false at 5% level of significance?

(ii) (**8 points**) find a 95% confidence interval for the true standard deviation of the lifetime of the batteries.

3. A tire company has three factories: A, B, and C, which manufacture 25%, 60%, and 15% respectively of the total production. The percentage of tires mislabeled by A, B, and C are 1%, 0.5%, and 2% respectively. Suppose you purchase a tire manufactured by this company.

(i) (**6 points**) Find the probability that the tire is mislabeled.

(ii) (**8 points**) Given that a tire is not mislabeled, find the probability that it is from Factory B.

4. According to the Bureau of Census, only 30% of all single parents own their homes.

(i)   (**6 points**) Suppose 80 single parents are chosen randomly, find the approximate probability that the sample proportion $\hat{p}$ of those who own homes, is at least 0.4.

(ii) (**9 points**) Suppose that 40 out of a random sample of 100 single parents own their homes. Can you conclude (at 5% level of significance) that the true proportion of single parents who own their homes is more than 30%? Also, find the P-value.

5. The weight of a certain brand of canned food is uniformly distributed between 15 and 17 ounces.

 (i)   (**6 points**) Find the probability that a randomly chosen can food weighs more than 16.5 ounces.

 (ii) (**5 points**) Suppose 10 cans are randomly picked and weighed before shipping, What is the probability that at least 2 of the cans are over 16.5 ounces.

 (iii) (**8 points**) Suppose the food cans are shipped in boxes of 36. Find the approximate probability that a randomly picked box will weigh over 585 ounces.

6. Airlines have a variety of regulations concerning the total linear dimension (Length + Width + Height) of each passenger's checked in baggage. Suppose that the length (L), width (W) and height (H) of a checked-in piece of baggage are independent and normally distributed with the following parameters:

	Mean (μ)	Standard deviation (σ)
Length (L)	25	3
Width (W)	18	2
Height (H)	7	2

(i) (**6 points**) What is the distribution of the total linear dimension D (D=L+W+H) of a typical piece of checked-in baggage? (Specify the distribution of D and compute its mean and standard deviation)

(ii) (**7 points**) A piece of baggage is "oversize" if its total linear dimension exceeds 60 inches. What percentage of checked-in baggage's are "oversize"?

(iii) (**6 points**) Assume that every passenger has two independent pieces of checked-in baggage. What percent of passengers have baggage with combined total linear dimension exceeding a limit of 110 inches?