

5/15/02 NJIT

Name:	SSN:	Section #
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Instructors: S. Balaji, M. C. Bhattacharjee, S. Dhar, H. Fanik N. Moheb

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<b>Total</b>	

**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	32	57.3	16.5
Section B	36	66.7	18.4

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.

2. A manufacturer of a generic brand batteries claims that the average lifetime is at least 25 hours. A consumer's group wants to challenge this claim. They randomly tested 20 batteries and found that the average lifetime of their sample was 23.5 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 90% 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 20%, 50%, and 30% respectively of the total production. The percentage of tires mislabeled by A, B, and C are 2%, 0.5%, and 3% 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 60 single parents are chosen randomly, find the approximate probability that the sample proportion  $\hat{p}$  of those who own homes, is at least 0.35.

(ii) **(9 points)** Suppose that 35 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 16 and 18 ounces.
- (i) **(6 points)** Find the probability that a randomly chosen can food weighs more than 17.5 ounces.
- (ii) **(5 points)** Suppose 10 cans are randomly picked and weighed before shipping, What is the probability that at most 2 of the cans are over 17.5 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 621 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 ( $\mu$ )	Standard deviation ( $\sigma$ )
Length (L)	27	2
Width (W)	15	3
Height (H)	10	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?

**END**