MATH 333: Probability & Statistics. Exam II, Spring 2002

April 17, 2002 NJIT

Name:	SSN:	Section #

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

Must show all work to receive full credit.

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

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

1. In a noisy communication channel, there is a 2% chance that each transmitted bit (0 or 1) will be corrupted. If a message of 1000 bits is transmitted, what is the approximate probability that:

   (a) **(7 points)** no more than 10 bits will be corrupted?

   (b) **(9 points)** exactly 30 bits will be corrupted?

Next Page ↓

2. Assume that the time (in **hours**) it takes to repair an electrical breakdown, is a continuous random variable X with probability density function,

$$f(x) = \begin{cases} 1, & \text{if } 0 < x < 1 \\ 0, & \text{otherwise.} \end{cases}$$

(a) **(4 points)** Find the expected repair time, in **minutes**.

(b) **(8 points)** Find the standard deviation of the repair time, *rounded to the nearest* ***minute.***

(c) **(7 points)** If the cost incurred in a repair which takes X (hours) is $10X^3 + 40$ dollars ($), find the expected repair cost**.**

3. (a) & (b) The number of fish caught by a fisherman is Poisson distributed with mean two per hour. Suppose, he starts fishing at 10 a.m., find the probability that the number of fish caught by him is:

(a) **(8 points)** at least one, by 10:30 a.m.,

Next Page ↓

3. (b) **(6 points)** exactly four, by noon.

4. The time it takes a bank clerk to process a check deposit has an exponential distribution with mean 50 seconds.

(a) **(8 points)** Compute the probability that a check deposit takes less than 40 seconds.

(b) **(8 points)** What is the median of this distribution?

5. (a) & (b) The mean GPA of engineering majors at a large university is 3.23, with a standard deviation of 0.72. Assume that any class of students represents a random sample from this university. In a class of 49 students, find the probability that the average GPA is:

(a) **(8 points)** between 3.2 and 3.25,

Next Page ↓

5. (b) **(7 points)** more than 3.4.

6. A researcher is interested in estimating the true average bonding strength (measured in suitable units) of a certain brand of an adhesive applied to two particular types of surfaces.

(a) **(10 points)** What sample size is necessary in order for the sample mean bonding strength to be within 5 of the true mean, with 99% confidence? The population standard deviation of the bonding strength is known to be 30.

(b) **(10 points)** Two hundred values of these bonding strengths resulted in a sample mean and standard deviation of 261.8 and 29.44, respectively.

Calculate the 98% confidence interval for the true mean bonding strength.

END