MATH 333:Probability & Statistics. **Exam 2** (Spring 2003)   Scores

#1	
# 2	
#3	
#4	
#5	
Total	

April 9, 2003 (A)   NJIT

Name:	SSN:	Section #

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➔ <u>**Must show all work to receive full credit.**</u>

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

1. Random variable X has probability density function $f(x) = (3x - x^2) / k$ if $0 \leq x \leq 3$,
    $f(x) = 0$ otherwise.

    (a) What is the value of k? (8 points)

    (b) Determine $F(2)$, where $F(x)$ is the cumulative distribution function of X. (8 points)

    (c) What is the expected value of X? (7 points)

    (d) What is the median of the distribution of X? (7 points)

                              (EXAM CONTINUES ON THE NEXT PAGE)

2. Telephone calls arriving at a phone exchange are often modeled as a Poisson process. Assume that on the average there are ten calls per hour.

   (a) What is the probability that there are exactly five calls in one hour? (7 points)

   (b) What is the probability that there are two calls or fewer in thirty minutes? (8 points)

   (c) What is the variance of the time between the arrival of one call and the third call thereafter? (*Hint:* What is the variance of the time between two consecutive calls?) (8 points)

3. It is known that the average annual salary of the employee in a specific department is $40,000 with standard deviation $12,000. A sample of forty of the employee's salaries was selected at random. What is the (approximate) probability that

   (a) the average for this sample is less than $35,000? (7 points)

   (b) the average for this sample is between $36,000 and $40,000? (8 points)

4. The life of automobile voltage regulators has an exponential distribution with a mean life of six years. You purchase an automobile that is six years old, with working voltage regulator, and plan to own it for six years.

    (a) What is the probability that the voltage regulator fails during your ownership? (8 points)

    (b) If your regulator fails after you own the automobile three years and it is replaced, what is the expected time until the next failure? (8 points)

5. A shipment of 800 microprocessor chips arrives in a factory. This factory will draw a random sample of twenty chips and accept the shipment only if there are no more than two defective chips in the sample.

    (a) If 4% of all chips are defective, what is the probability of *rejecting* the shipment? (8 points)

    (b) If 20% of all chips are defective, what are the expected value and variance of the number of defective chips in the sample? (8 points)

END OF EXAMINATION