

**MATH 244: Introduction to Probability Examination II (Fall 2006)**

December 05, 2006 NJIT

*Instructor:*  
**S. Dhar**

Name:

Student#:

Section # 001

→ **Must show all work to get full credit.**

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

1. Twelve percent of the population is left handed. Approximate the probability that there are at least 25 lefthanders in a school of 200 students. State your assumptions. (15 pts)
  
  
  
  
  
  
  
  
  
  
2. It is known that diskettes produced by a certain company will be defective with probability 0.01, independently of each other. The company sells the diskettes in packages of size 12 and offers a money-back guarantee that at most 1 of the 12 diskettes in the package will be defective.
  - (a) (12 pts) If someone buys a package, what is the probability that the package is within the guarantee so that he or she will not have to return it due to the package being excessively defective?
  - (b) (4 pts) If someone buys 3 packages, what is the probability that all three of the packages are within the guarantee so that he or she will have to return none of the packages due to them being excessively defective?

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3. Let  $X$  have cumulative distribution function given by  $F(x)$ .

$$F(x) = \begin{cases} 0, & x < 0, \\ \frac{x+1}{4}, & 0 \leq x < 1, \\ 1, & 1 \leq x. \end{cases}$$

Compute the following probabilities:

(a)  $P(X = 0.5)$ , (5 pts)

(b)  $P(0.5 < X \leq 1.0)$ , (5 pts)

(c)  $P(X < 1.0)$ . (5 pts)

4. If  $X$  is uniformly distributed over  $(0, 2)$  find the density function of  $Y = e^{-2X}$ . (13 pts)

5. Let  $X$  and  $Y$  be two independent Binomial random variables with parameters  $n_X = 5$ ,  $p_X = 0.5$  and  $n_Y = 7$ ,  $p_Y = 0.5$ , respectively. Find the probability mass function of  $U = X + Y$ . Give reason for your answer. (10 pts)

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6. The expected number of typographical errors on a page of a certain magazine is 0.3. What is the probability that an article of 15 pages contains
- No typographical errors? (7pts)
  - More than one typographical error? (7pts)
7. If  $X$  and  $Y$  are independent identically distributed uniform random variables on  $(0, 1)$ :
- Compute the joint density function of  $U = X + Y$  and  $V = X - Y$ . (12 pts)
  - Also, compute the density of  $X - Y$ . (5 pts)

**END**