

**MATH 333: Probability & Statistics. Examination #1 (Fall 2004)**

October 6, 2004 (A) NJIT

Name:	SSN:	Section #
-------	------	-----------

*Instructors : A. Jain, K. Johnson, H. Khan, K. Rappaport, S. Roychaudhury*

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

Score	
#1	
# 2	
#3	
#4	
#5	
<b>Total</b>	

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

1. The research department of a company develops new product designs. These designs are reviewed by a random sample of potential customers, who are asked to classify each new design as either good or bad. When the new designs are implemented as new products, it is found that 40% are highly successful, 35% are moderately successful and the remaining 25% have low success. An analysis of the past customer reviews of the implemented new product designs yielded the following summary:

Type of product	% Product Design Reviews that were Good
Highly successful	95
Moderately successful	60
Low success	10

- (a) What is the probability that a randomly chosen new product design will receive a good review? (7 pts)
- (b) If a new product design receives a good review, what is the probability that it will be a highly successful product? (7 pts)
- (c) If a new product design receives a bad review, what is the probability that it will be a highly successful product? (6 pts)

2. Physical education researchers, interested in the development of the over-arm throw, measured the horizontal velocity of each thrown ball at the time of release. The results for first grade children (in feet/second) are as follows:

**MALES**

54.2, 39.6, 52.3, 48.4, 35.9, 30.4, 25.2, 45.4, 48.9, 48.9, 45.8, 44.0, 52.5, 48.3, 59.9, 51.7, 38.6, 39.1, 49.9, 38.3

**FEMALES**

30.3, 43.0, 25.7, 26.7, 27.3, 31.9, 53.7, 32.9, 19.4, 23.7, 23.3, 23.3, 37.8, 39.5, 33.5, 30.4, 28.5

- (a) Prepare separate stem-and-leaf displays for the MALES and FEMALES data. What inferences can you draw from these displays? (7 pts)
- (b) Prepare comparative boxplots for the MALES and FEMALES data. Are there any mild or extreme outliers in these data sets? Show all your steps such as the computation of the median, lower and upper fourths (i.e., quartiles), and inter-quartile range ( $f_s$ ). (7 pts)
- (c) Find the sample mean and standard deviation for the FEMALES data. [Hint: the sum of the 17 FEMALES data values is 530.9 and the sum of squares is 17,741.05] (6 pts)

3. A bag contains 12 balls – 5 white, 3 red, and 4 black. Three balls are drawn at random from the bag without replacement. Find the probability that (4 pts each):

- (a) none of the balls is red
- (b) exactly one ball is red
- (c) at least one ball is red
- (d) all 3 balls are of the same color
- (e) all 3 balls are of different colors

4. A real estate agent is showing houses to a prospective buyer. There are 10 houses listed in the desired price range. (5 pts each)

- (a) The buyer has time to see only 4 houses. In how many different ways can the agent choose 4 houses (out of the 10 houses listed) to show the buyer, if the order of the visits to the houses is considered?
- (b) Again, the buyer has time to see only 4 houses. In how many different ways can the agent choose 4 houses to show the buyer, if the order of the visits to the houses is disregarded?
- (c) Suppose that 4 of the 10 houses listed are new construction and the remaining 6 houses are used. If the agent chooses 4 houses at random from the 10 houses listed, what is the probability that all 4 houses chosen are new?
- (d) Again, suppose that 4 of the 10 houses listed are new. But, now the buyer has time to see only 3 houses. What is the probability that there is at least one new house among the 3 houses chosen at random for showing the buyer?

5. A factory has two machines to produce its parts – Machine A makes 70% of all parts and Machine B makes the remaining 30%. Of the parts made by machine A, 1 in 200 is defective. Similarly, of the parts made by machine B, 2 in 100 are defective. The defective parts are sent to a repair shop.

- (a) If you select a defective part at random from the repair shop, what is the probability that it was produced by Machine B? (10 pts)
- (b) If a customer receives a good part from this factory, what is the probability that it was produced by Machine A? (10 pts)

**END**