

<b>Name:</b>	<b>SSN:</b>	<b>Section #</b>
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**I pledge my honor that I have abided by the Honor System.** \_\_\_\_\_

1. A system consists of two components. The probability that the second component functions in a satisfactory manner during its design life is 0.9, the probability that at least one of the two components does so is 0.96, and the probability that both components do so is 0.75. Given that the first component functions in a satisfactory manner throughout its design life, what is the probability that the second one does also?

(13 pts)

2. A mouse is inside a room and each of the 4 walls of the room has a door through which the mouse could attempt to escape. Unluckily for the mouse, there is a trap at each of the doors  $d_1, d_2, d_3, d_4$  and they work with probabilities 0.3, 0.2, 0.3 and 0.5, respectively. The mouse picks a door at random. Given that the mouse escapes, what is the probability that the mouse chose door  $d_3$  to escape?

(10 pts)

3. Consider three independent events  $A_1$ ,  $A_2$ , and  $A_3$  and let  $p_i = P(A_i)$  for  $i = 1, 2, 3$ .
- (a) Use the  $A_i$ 's and complementation notation ( ' ) to describe the outcome “ $A_2$  is the only event that occurs”. Then, illustrate the outcome of interest by means of a Venn diagram, shading the area corresponding to “ $A_2$  is the only event that occurs”.
- (7 pts)

- (b) Express the probability that exactly one of the three events occurs in terms of the  $p_i$ 's.
- (8 pts)

3. Twenty healthy men were asked to walk as straight as possible to a target 60 m away at normal speed. Consider the following observations on cadence (number of strides per second):

0.95	0.85	0.92	0.95	0.93	0.86	1.00	0.92
0.85	0.81	0.78	0.93	0.93	1.05	0.93	1.06
1.06	0.96	0.81	0.96				

- a) Find the sample average and the median cadence.
- (8 pts)
- b) Construct a stem-and-leaf plot showing the distribution of cadences.
- (10 pts)

- c) Using your answers to parts (a) and (b), comment on the symmetry or lack of symmetry in the observed cadences.
- (5 pts)

5. A committee consists of five Hispanics, two Asians, three African-Americans, and two Caucasians. A subcommittee of four is chosen at random. What is the probability that all the ethnic groups are represented on the subcommittee?

(12 pts)

6. Three students are selected at random from a statistics class, and it is observed whether or not they suffer from Mathematics Anxiety. Let S denote suffering from Mathematics Anxiety and let N denote **not** suffering from Mathematics Anxiety. Suppose that every student in the class has a 50% chance of suffering from Mathematics Anxiety. Using the S and N notation, answer the following questions.

- (a) How many total outcomes are possible? List the sample space.

(10 pts)

- (b) What is the probability that at most two of the three students suffer from Mathematics Anxiety?

(5 pts)

7. An electrical system consists of four components labeled 1, 2, 3, and 4, as shown in the figure below. Component 1 works with probability 0.6, Component 2 works with probability 0.7, Component 3 works with probability 0.8, and Component 4 works with probability 0.9. These four components operate independently of one another. The system works if we can get electricity to move from the left end to the right end. What is the probability that the system works?

(12 pts)

