

ECSE-305 (Fall 2004)  
Probability and Random Signals I

Assignment 1

September 8, 2004

Student Name:

1. \_\_\_\_\_

ID:

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Section:

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2. \_\_\_\_\_

Section:

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Q#	Marks
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
<b>Total</b>	

### Question 1.

Let  $P$  be a probability defined on a subset  $S$ . For event  $A$  of subset  $S$  define  $Q(A) = [P(A)]^2$  and  $R(A) = P(A)/2$ . Is  $Q$  a probability on  $S$ ? Is  $R$  a probability on  $S$ ? Why or why not?

### Question 2.

Let  $A, B$  and  $C$  be three events. Prove that

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C).$$

### Question 3.

A number is selected randomly from the set  $\{1, 2, \dots, 1000\}$ . What is the probability that

- (a) It is divisible by 3 but not by 5;
- (b) It is divisible neither by 3 nor by 5?

### Question 4.

A point is selected at random from the interval  $(0, 2000)$ . What is the probability that

- (a) It is greater than 400 and less than 800;
- (b) It is a rational number?

### Question 5.

Five boys and five girls sit in a row at random. What is the probability that the boys are together and the girls are together?

### Question 6.

A fair die is tossed eight times. What is the probability that in these eight tosses we get exactly two 3's, exactly three 1's, and exactly two 6's all together?

### Question 7.

A class contains 30 students. What is the probability that there are six months each containing the birthday of two students, and six months each containing the birthday of three students? Assume that all months have the same probability of including the birthday of a randomly selected person.

### Question 8.

Suppose that five points are selected at random from the interval  $(0, 1)$ . What is the probability that exactly two of them are between 0 and  $1/4$ ?