Statistics (MATH 271)

Homework Assignment

Instructor: Halil Bayraktar

HW is prepared to help you doing practice about probability and counting that you have learned in lecture 3/4/5. There are 6 questions.

Please download and print this pdf document. You should only use this document to write your answers/solutions in a provided space in each question. You should also download other files needed to answer questions.

You should write clearly and concisely. Put your final answer to the box given in each question for full credit. You have to show all your work for full credit.

It is not allowed to take another student's solution. You cannot give your solution/results to your classmates.

Good luck.

(Type in capital letters)

First Name:

Last Name:

ID:

Signature:

Question	Score
Q1 (20)	
Q2 (20)	
Q3 (20)	
Q4 (20)	
Q5 (10)	
Q6 (10)	

1. (20 points) - In this question, you will solve a boy or girl paradox problem. Martin Gardner prepared this question in 1959 and published in Scientific American.

   a) Mr. Jones has two children. Given that **the older child is a girl**, what is the probability that both children are girls?

   b) Mr. Smith has two children. Given that **at least one of them is a boy**, What is the probability that both children are boys?

2. (20 points) In this question, you will analyze the probability events in a dice-game. Suppose you have 4 dices each with 6 side,

   a) How many different possible outcomes are possible if you roll 4 dices?

   b) Given that all 4 numbers are expected to be different, how many different outcomes are possible?

   c) What is the probability of getting <u>at least</u> 2 numbers same if you roll 4 dices?

d) What is the probability of getting all different numbers if we roll 4 dices?

3. (20 points) Given that there are AATGAGCTTC nucleotides in a short oligo, how many different 10-base pair sets can be generated?

4. (20 points) Parents are heterozygous for a genetic disorder and have 4 children. What is the probability that at least one child will have this genetic disease?

5. (10 points) A student tosses a fair 5-sided die to guess the answers on a multiple-choice exam. There are total of 8 questions and each question has 5 possible choices like (A,B,C,D or E).

a) What are the expected average true answers and standard deviation of the number of correct answers?

b) What is the probability that a student will get exactly 2 questions correct?

c) What is the probability that a student will get more than 4 questions correct?

d) What is the probability that a student will get between 3 and 7 questions correct?

e) If the passing score for the exam is %50, what is the probability that he will pass the exam?

6. (10 points) Given that three is a parent carrying three hybrid (trihybrid) heterozygous genes.

Parent 1 is XxYyZz and Parent 2 XxYyZz.

a) What is the probability that offspring carries 1 dominant and 2 recessive genes?

b) What is the probability that offspring carries 2 dominant and 1 recessive genes?

c) What is the probability that offspring carries 3 recessive genes?