

MTH 421
Half Exam 1
Fall 2021

Show all work in a neat and organized fashion. Clearly indicate your answers.
50 points possible.

1. (10 pts.) In a lottery, six digits are drawn at random one at a time with replacement from 0 through 9 inclusive. Suppose that you win if any permutation of your selected integers is drawn. Give the probability of winning if you select

(a) 3, 3, 4, 5, 6, 7

(b) 5, 5, 5, 6, 6, 7

2. (10 pts.) An insurance company examines its pool of auto insurance customers and gathers the following information:

- (i) All customers insure at least one car.
- (ii) 90% of the customers insure more than one car.
- (iii) 40% of the customers insure a sports car.
- (iv) Of those customers who insure more than one car, 35% insure a sports car.

Calculate the probability that a randomly selected customer insures exactly one car and that car is not a sports car.

3. (10 pts.) An urn contains five colored marbles: three orange and two red. Two marbles are selected at random without replacement, and you are told that at least one of them is red. What is the probability that both marbles are red?

4. (10 pts.) An urn contains 20 marbles: 17 green and 3 violet. A second urn contains 15 green marbles and an unknown number of violet marbles. A single marble is drawn from each urn. The probability that both marbles are the same color is 0.28125.

Calculate the number of violet marbles in the second urn.

5. (10 pts.) Let B and C be independent events.

Prove $P(B \cup C') = 1 - P(C) + P(B)P(C)$.