

**Mathematical Statistics – Math 376**  
**Spring 2021 Quiz 1**

Answer the following questions. Each question has 5 pt.

**Q1.** A biased die is rolled  $N$  times independently. In each roll, the probability of getting the outcome  $i$  is  $p_i$  for  $i = 1, 2, \dots, 6$ . Let  $X_1, \dots, X_6$  be the number of times the outcomes  $1, 2, \dots, 6$  are observed respectively. Derive  $E[X_1(X_2 - 1)X_3]$ .

**Q2.** Suppose  $X$  and  $Y$  are independent and each has Gamma(2, 1) distribution. Obtain the pdf of  $Z = \max\{X, Y\}$ .