MATH 667-01 Homework 1

Due: Tuesday, August 29, 2017

Instructions: *Each of the following problems must be submitted to the instructor on or before the due date. Partial credit may be given for incorrect answers which make some positive progress. Late homework will not be accepted.*

1. (5 points) Suppose that there are ten marbles in a box, 6 of which are red and 4 of which are blue. Four marbles are selected at random **with replacement** from the box. What is the probability that exactly one of the selected marbles is red?

2. (10 points) Suppose that there are ten marbles in a box, M of which are red and $10 - M$ of which are blue. We select four marbles at random with replacement and observe 1 red marble and 3 blue marbles. What is the maximum likelihood estimate of M, the number of red marbles in the box?

3. (10 points) Suppose that there are ten marbles in a box, M of which are red and $10 - M$ of which are blue where M is unknown. If the true value of M is 6, find the sampling distribution for the maximum likelihood estimator of M based on a sample of four marbles selected at random with replacement.