MATH 113: DISCRETE STRUCTURES
HOMEWORK 24

Due: Friday, April 3 at 10pm.

Problem 1. A subset X is chosen uniformly at random from the set $[n]$. (The word "uniform" here means that each subset is equally likely.)

(a) What is the probability that X has an even number of elements?
(b) Suppose $n \geq 2$. What is the probability that X contains 1 and n?
(c) Suppose $n \geq 10$. What is the probability that the smallest number in X is 10?

Problem 2. Suppose a bag contains balls numbered $1, 2, \ldots, 10$. Choose two balls from the bag.

(a) What is the probability the first ball is 5 and the second is 3 if the ball numbered 5 is not put back into the bag before drawing the second ball?
(b) What is the probability the first ball is 5 and the second is 3 if the ball numbered 5 is put back into the bag before drawing the second ball?

Problem 3. Recall that a standard poker deck has four suits and 13 cards within each suit. The deck contains 4 aces (one of every suit).

(a) What is the probability that a five-card poker hand contains exactly one ace?
(b) What is the probability that a five-card poker hand contains at least one ace?