MATH 3332, Homework Assignment 1

This HW is due on 6/16 at 12:01PM. Details instructions about how to submit your solutions with be given shortly in a nother file.

Problems:

1. Two dice are tossed in a row.

   Let X be the outcome of the first die,

   and let Y be the outcome of the second die.

   Let A be the event that $X + Y \leq 7$,

   and let B be the event that $X - Y \geq 2$.

   (a) Find $P(A)$ and $P(B)$.

   (b) Find $P(A \cap B)$.

   (c) Are A and B independent?

2. (a) In how many ways can we select a five-digit PIN number.

   (b) In how many ways can we select a five-digit PIN number in which all five digits are distinct.

   (c) In how many ways can we select a five-digit PIN number in which the five digits are all distinct and are decreasing from left to right.

3. Let the experiment be the toss of three dice in a row.

   Let X be the outcome of the first die.

   Let Y be the outcome of the 2nd die.

   Let Z be the outcome of the 3rd die.

   Let A be the event that $X > Y$,

   let B be the event that $Y > Z$,

   let C be the event that $Z > X$.

   (a) Find $P(A)$ and $P(B)$.

   (b) Find $P(A \cap B)$.

   (c) Are A and B independent?

   (d) Are A, B, C pairwise independent?

   (e) Find $P(A \cap B \cap C)$.

   (f) Are A, B, C mutually independent?

4. A box contains 11 red chips and 4 blue chips.

   We perform the following two-step experiment:

   (1) First, a chip is selected at random from the first box and is removed from box. (After this first step, there are 14 chips left in the box.)

   (2) Then, a chip is selected at random from the box (that is, from the remaining 14 chips).

   Let B_1 be the event that the chip removed from the box at the first step of the experiment is red. Let B_2 be the event that the chip removed from the box at the first step of the experiment is blue.

   Let A be the event that the chip selected from the box at the second step of the experiment is red.

   (a) Find $P(B_1)$ and $P(B_2)$.

   (b) Find $P(A)$.

   (c) Find $P(B_1|A)$ and $P(B_2|A)$.