Assignment 3, PME, 4th Semester, Spring

Deadline: Monday, 6 July 2020, 3 pm

Assignment should be hand written.
Write your name, registration No. and section; else your assignment may not be marked.
Copying is not allowed.
Properly staple your pages (binding is not required).

1. Let $S = \{1, 2, 3, 4\}$ and $A = \{1, 2\}$, $B = \{1, 3\}$, $C = \{1, 4\}$. Assume the outcomes are equiprobable. Are *A* and *B* independent? Are *A* and *C* independent events?
2. Player *A* and *B* practice shots at penalty in free time. *A* succeeds with probability p_a and *B* with probability p_b such that the probabilities are independent. Find the probability of the following outcomes when *A* and *B* each take one shot: *A* scores; Either *A* or *B* scores; both score; both miss.
3. Suppose that five numbers are selected at random from the interval [3, 6]. Find the probability that the first three numbers are less than 5 and the last two numbers are greater than 4.
4. Suppose that a dice is rolled four times. We assume that the outcomes are independent and the dice is fair. Find the probabilities of 0, 1, 2, 3 and 4 sixes.
5. A student needs eight chips of a certain type to build a circuit. It is known that 5% of these chips are defective. How many chips should he buy for there to be a greater than 90% probability of having enough chips for the circuit? (Use Binomial Probability Law and consider n = 8, 9, ...)
6. What is the probability of getting a six on the third attempt if you roll a fair dice?
7. Three employees work in a restaurant, including a cook and 2 waiters. The restaurant can be open only if the cook and at least one waiter are available (not on leave) on a given day. The probability that the cook is not available on a given day is 0.15 and that a waiter is not available is 0.25. All the employees go on leave independently of each other. What is the probability that the restaurant is open on a given day? What would be the probability that the restaurant is open on a given day if another cook is employed?
8. In a student hostel, students are allowed to go to bed and sleep in the afternoon after 2 o'clock but they have to wake up before 4 o'clock. Let *x* be the time a student goes to bed and *y* the time he wakes up. Find the sample space if the outcome consists of pair (*x*, *y*) and sketch it on *x*-*y* plane. Specify and sketch an event *A* such that the student is awake before 3 o'clock. Specify and sketch an event *B* such that the student sleeps more than one hour. Are *A* and *B* independent?