1) (from Rabinowitz) Five fair dice are rolled. Find the probability that:

a) all five numbers are different

b) at least two dice show the same number

c) at least one die shows a 6

2) Each firing of a missile at a target has a .21 probability of striking the target. The outcome of each firing is independent of the outcome of any others.

a) What is the probability of destroying the target with three shots?

b) I keep firing until I destroy the target. What is the expected number of shots I have to fire?

3) (from Durret) Roll two dice. Let A="the sum is even" and B="the sum is divisible by 3" (i.e. B={3, 6, 9, 12}). Are A and B independent? explain

4)Roll two dice. Let A="The first die is odd" and B="the second die is odd" and C="the sum is odd". Show these events are pairwise independent, but not independent

5) (from Durret) You want to invent a game where the player bets $1, and rolls two dice. If the sum is 7, the player wins $k, and otherwise loses their bet.

a) What value of $k makes the game fair?

b) If k=1, what is the expected value of the game to the player?