

American University of Beirut
Statistics 230 Sections 3 and 4
Exam 1, Spring 2010

NAME:

Answer the following question by giving a brief justification. You can use the other blank side of the page to finish your work if needed.

1. Find the coefficient of x^7 in the expression $(2x - 1)^{11}$.
2. Cards from a regular deck of 52 cards are drawn one by one and without replacement. Find the following.
 - (a) the probability that the fifth red card is observed on the eighth drawing.
 - (b) the probability that the fourth card is a heart.
3. Five people, who are supposedly unrelated, get into an elevator of a building with 8 floors. What is the probability that no two people land on the same floor?
4. In a repeated experiment of rolling a fair die twice, find the probability that we observe a sum of six before either a sum of 2 or 3.
5. A system has n components that operate independently of each other. The system fails when all components fail simultaneously. If the probability of failure for each component is 0.4, find the number of components needed so that the probability of failure does not exceed 0.1%.
6. Three processes of a company produce rolls of materials: the rolls of Process I are 1% defective, the rolls of Process II are 2% defective and the rolls of Process III are 3% defective. Process I produces 60% of the company's output, Processes III and III 30% and 10% respectively. A roll is selected at random from the total output. Given that this roll is defective, what is the probability that it is from process I?
7. A box contains five chips of which four are black and one is white. Apart from the color, the chips have identical size and shape. Two players take turns drawing chips without replacement from the box. The winner is the one who selects the white chip. Is there any advantage in being the first one to draw? Hint: Consider all the cases of winning.

8. Repeat the previous question when the drawing is performed with replacement. Hint: note that the drawing in this case can go on indefinitely.