

ECE302F Lecture Group 04 Quiz 1

Rules:

- No books or aid sheets of any sort allowed;
 - Non-programmable electronic calculators CAN be used;
 - Total duration of quiz: 30 minutes;
 - Answer all questions.
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1. Is it possible for A and B to be independent events, yet satisfy $A = B$? Explain your answer in less than 20 words. (3 marks)

2. Each time a fisherman casts his line, a fish is caught with probability p , independent of his success or failure on other casts. The fisherman will fish all day until a fish is caught and then he quits and goes home. Let C_i denote the event that on cast i the fisherman catches a fish. Draw the tree diagram for this experiment and find the following probabilities:

(a) $P[C_1]$;

(b) $P[C_2]$;

(c) $P[C_n]$, where n is any positive integer. (4 marks)

3. In a deck of 52 cards, there are 26 red cards and 26 black ones. Of the 26 red cards, one is the Queen of hearts. We perform the random experiment of picking one card out of the deck, and noting which one it is (Ace of Clubs, Two of Diamonds, etc.), and define the following events:

$$A = \text{“Queen of hearts is drawn.”}$$

$$B = \text{“A red card is drawn.”}$$

$$C = \text{“A black card is drawn.”}$$

Given that all cards are equally likely to be selected, find

(a) $P(A \cap B)$;

(b) $P(A|B)$ using the result of part (a);

(c) $P(B|A)$ using the result of part (b). (3 marks)