

1.[5pt] If we draw a card randomly from a deck of cards (total 52), let
event A = face card, event B=club card

a. Are the above events A and B disjoint? Why?

No, the intersection of the two events is not empty

$$A \cap B = \{J\clubsuit, Q\clubsuit, K\clubsuit\} \neq \phi$$

b. Find the probability that the card drawn is a face card or a club card.

$$P(A) = 12/52, P(B) = 13/52$$

$$P(A \cap B) = 3/52$$

Use the additive law,

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) = \frac{12}{52} + \frac{13}{52} - \frac{3}{52} = \frac{22}{52} = 0.423$$

2. [5pt] A batch of 9 parts contains 4 defective parts and 5 good parts. An inspector plans to choose a random sample of 3 of the parts for inspection.

a. What's the probability that two parts are good and one part is defective?

$$P(\text{all three good}) = \frac{\binom{5}{2} \binom{4}{1}}{\binom{9}{3}} = \frac{40}{84} = 0.476$$

b. What is the probability that at least one part is good?

Let event A = {at least one part is good}

the complement of A, \bar{A} = {no one is good} = {all three defective}

$$P(\bar{A}) = \frac{\binom{5}{0} \binom{4}{3}}{\binom{9}{3}} = \frac{4}{84} = 0.0476, P(A) = 1 - P(\bar{A}) = 1 - 0.0476 = 0.9524$$