King Fahd University of Petroleum and Minerals
College of Sciences
Quiz #4(A)

St. ID: St. Name: **Section:** Serial#:

Q1: Roll a die twice. Then:

a) find the probability that the sum of the two numbers is at least 4.

Solution:

P(that the sum of the two numbers is at least 4) = 1 - P(that the sum of the two numbers is less than 4) = 1 - P(that the sum of the two numbers is either 2 or 3) = 1- P$\{(1,1),(1,2),(2,1)\}$ = 1- $\frac{3}{36}$ = $\frac{11}{12}$

b) find the probability that the sum of the two numbers is at least 4 given that their sum is at most 5.

Solution:

P(that the sum of the two numbers is at least 4 given that their sum is at most 5) = P(A/B) = P(A$\cap$B)/P(B)
= P(the sum of the two numbers is 4 or 5)/P(the sum of the two numbers is at most 5)
= $(\frac{7}{36})/(\frac{10}{36}) = \frac{7}{10} = 0.7$

c) Let A denote the event where the sum of the numbers is between 5 and 7 and B denote the event where the number on the number on the 2^{nd} roll is either 3 or 5. Then are A and B independent? Why?

Solution:

P(A$\cap$B) = P$\{(2,3),(3,3),(4,3),(1,5),(2,5)\}$ = $\frac{5}{36}$

$P(A)=\frac{15}{36}$ and $P(B)=\frac{12}{36}$

imply that P(A$\cap$B) = P(A)P(B).

Thus A and B are independent.

Q2: Draw 5 balls from an urn containing 8 white balls and 17 black balls. Then find the probability that you will get 3 black balls if drawing is :

a) with replacement

Solution:

P(you will get 3 black balls)

$= (5C3)P(bbbww) = (5C3)((\frac{17}{25})(\frac{17}{25})(\frac{17}{25})(\frac{8}{25})(\frac{8}{25})$

b) without replacement

Solution:

P(you will get 3 black balls)

$= (5C3)P(bbbww) = (5C3)((\frac{17}{25})(\frac{16}{24})(\frac{15}{23})(\frac{8}{22})(\frac{7}{21})$

Or

P(you will get 3 black balls) = $\frac{(17C3)(8C2)}{25C5)}$

Q3: Given that P(A) = .42, P(B) = .35 and P(AUB) = .75, then

a)find $P(A^{'}/B^{'})$

Solution: $P(A^{'}/B^{'}) = \frac{P(A' \cap B')}{P(B')} = \frac{1 - P(A \cup B)}{1 - P(B)} = \frac{1-.75}{1-.35} = \frac{25}{65}$

b) Are A and B independent? Why?

Solution: No, because $P(A^{'}/B^{'}) \neq P(A^{'})$

Or because $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

implies that $P(A \cap B) = .35 + .42 - .75 = .02 \neq$ P(A)P(B) = (.35)(.42)