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

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 6.

Solution:

P(that the sum of the two numbers is at least 4 given that their sum is at most 6) = P(A/B) = P(A$\cap$B)/P(B)
= P(the sum of the two numbers is 4 or 5 or 6)/P(the sum of the two numbers is at most 6)
= $(\frac{12}{36})/(\frac{15}{36}) = \frac{12}{15} = 0.8$

c) Let A denote the event where the sum of the numbers is between 6 and 8 and B denote the event where the number on the number on the 2^{nd} roll is either 4 or 6. Then are A and B independent? Why?

Solution:

P(A$\cap$B) = P$\{(2,4),(3,4),(4,4),(1,6),(2,6)\}$ = $\frac{5}{36}$

$P(A)=\frac{16}{36}$ and $P(B)=\frac{12}{36}$

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

Thus A and B are **not** independent.

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Q2: Draw 5 balls from an urn containing 10 white balls and 15 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)

$$= (5C3)P(bbbww) = (5C3)((\frac{15}{25})(\frac{15}{25})(\frac{15}{25})(\frac{10}{25})(\frac{10}{25})$$

b) without replacement

Solution:

P(you will get 3 black balls)

$$= (5C3)P(bbbww) = (5C3)((\frac{15}{25})(\frac{14}{24})(\frac{13}{23})(\frac{10}{22})(\frac{9}{21})$$

Or

P(you will get 3 black balls) = $\frac{(15C3)(10C2)}{25C5)}$

Q3: Given that P(A) = .38, P(B) = .32 and P(AUB) = .64, then

a)find $P(A'/B')$

Solution: $P(A'/B') = \frac{P(A' \cap B')}{P(B')} = \frac{1 - P(A \cup B)}{1 - P(B)} = \frac{1 - .64}{1 - .32} = \frac{36}{68}$

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 $P(A \cap B) = .38 + .32 - .64 = .06 \neq$ P(A)P(B) = (.38)(.32)

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