

Quiz 3 Last Name: _____ First _____

Show all work and use proper notation for full credit.

1) The probability that event A occurs is 0.63. The probability that event B occurs is 0.45. The probability either A or B occurs is 0.9. Find the following:

a. Find the probability of A given B.

b. Find the probability of B given A.

$$\begin{aligned} P(A) &= 0.63 & P(A \cup B) &= P(A) + P(B) - P(A \cap B) \\ P(B) &= 0.45 & 0.9 &= 0.63 + 0.45 - x \\ P(A \cup B) &= 0.9 & P(A \cap B) &= 0.18 \end{aligned}$$

$$P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{0.18}{0.45} = 0.4$$

$$\begin{aligned} P(B|A) &= \frac{P(B \cap A)}{P(A)} \\ &= \frac{0.18}{0.63} = 0.286 \end{aligned}$$

c. Are the results independent (according to the mathematical definition of independence)? Show reasoning/logic/calculations for your answer.

$$\begin{aligned} P(A) \cdot P(B) &= (.63)(.45) \\ &\neq 0.18 = P(A \cap B) \end{aligned} \quad \text{so } A, B \text{ are not indep.}$$

2) A specialty manufacturer estimates that there is a 3.5% probability of selling a defective product. There is also a 2.5% probability of being sued on a given sale. The probability of either selling a defective product or getting sued is 5.9%. What is the probability of getting sued given that they have sold a defective product?

D = event of selling a defective product
S = " " " being sued

$$P(D) = 0.035 \quad P(S) = .025 \quad P(D \cup S) = .059$$

$$.059 = .035 + .025 - P(D \cap S)$$

$$.001 = P(D \cap S)$$

$$P(S|D) = \frac{P(S \cap D)}{P(D)} = \frac{.001}{.035} = .026$$

3) In a study to determine employee-voting patterns in a recent strike vote, 1000 employees were selected at random and the following table was made. What is the probability of being paid hourly (H) given that he or she voted in favor of the strike (Y)? Show all work with proper notation please.

		Salary Classification			Totals
		Hourly (H)	Salary (S)	Salary+Bonus (B)	
To Strike	Yes (Y)	400	180	20	600
	No (N)	150	120	130	400
Totals		550	300	150	1000

$$P(H|Y) = \frac{n(H \cap Y)}{n(Y)} = \frac{400}{600} = 0.667$$