King Fahd University of Petroleum & Minerals
Department of Mathematics & Statistics
STAT-319-Term073-Quiz2-A - SOLUTIONS

Name: ID: Sec.: Serial:

Q1. Disks of polycarbonate plastic from a supplier are analyzed for scratch and shock resistance. The results from 100 disks are summarized as follows:

Scratch resistance	Shock resistance		
	High	Low	Total
High	70	9	79
Low	13	8	21
Total	83	17	100

a) If a disk is selected at random, what is the probability that its scratch resistance is high (A) and its shock resistance is high (B)?

$$P(A \cap B) = \frac{70}{100} = 0.70$$ **(2-Points)**

b) If a disk is selected at random, what is the probability that its scratch resistance is high (A) or its shock resistance is high (B)?

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) = \frac{79}{100} + \frac{83}{100} - \frac{70}{100} = \frac{92}{100} = 0.92$$

(1-Point) **(3-Points)** **(1-Point)**

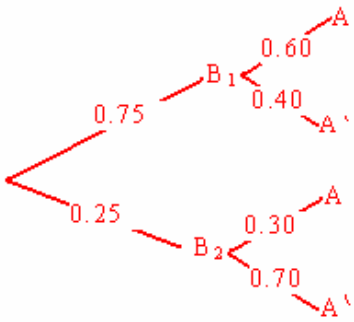
c) If a disk is selected at random and found that its shock resistance is low (E), what is the probability that its scratch resistance is high (A)?

$$P(A \mid E) = \frac{P(A \cap E)}{P(E)} = \frac{9/100}{17/100} = \frac{9}{17} = 0.5294$$

(2-Points) **(2-Points)** **(1-Point)**

Q.2 A paint-store chain produces and sells latex and semigloss paint. Based on long-range sales, the probability that a customer will purchase latex is 0.75. Of those that purchase latex, 60% also purchase rollers. But 30% of semigloss buyers purchase rollers. A randomly selected buyer purchases a roller and a can of paint. What is the probability that the paint is Latex?

Let B_1: The can of paint is latex
B_2: The can of paint is semigloss
A: A buyer purchases a roller



$$P(A) = P(A \mid B_1)\,P(B_1) + P(A \mid B_2)\,P(B_2)$$
$$= (0.6)(0.75) + (0.30)(0.25)$$ **(3-Points)**
$$= 0.45 + 0.075 = 0.525$$

$$P(B_1 \mid A) = \frac{P(B_1 \cap A)}{P(A)}$$ **(2-Points)**

$$= \frac{P(A \mid B_1)\,P(B_1)}{P(A)} = \frac{(0.6)(0.75)}{0.525}$$ **(2-Points)**

$$= \frac{0.45}{0.525} = \frac{6}{7} = 0.8571$$ **(1-Point)**