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

Name: ID: Sec.: Serial:

Q1. The analysis of shafts for a compressor is summarized by conformance to specifications.

Surface Finish Conforms	Roundness conforms		Total
	Yes	No	
Yes	345	15	360
No	22	18	40
Total	367	33	400

a) If a shaft is selected at random, what is the probability that the shaft conforms to surface finish requirements?

$$P(A) = \frac{360}{400} = \frac{9}{10} = 0.90$$

(1-Point) **(1-Point)**

b) What is the probability that the selected shaft conforms to surface finish requirements (A) or to roundness requirements (B)?

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) = \frac{360}{400} + \frac{367}{400} - \frac{345}{400} = \frac{382}{400} = \frac{191}{200} = 0.955$$

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

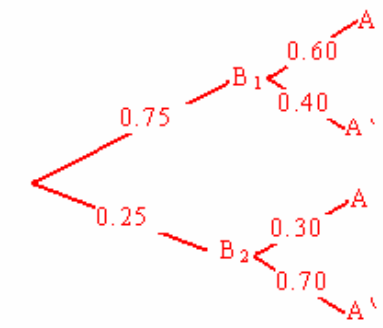
c) If we know that a shaft **does not conform to roundness requirements (E)**, what is the probability that **it conforms to surface finish requirements (A)**?

$$P(A \mid E) = \frac{P(A \cap E)}{P(E)} = \frac{15/400}{33/400} = \frac{15}{33} = 0.4545$$

(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



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

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

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

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