Q13.

		high	Low	Total
Surface	high	12	16	28
Roughness	Low	88	34	122
Total		100	50	150

a. P[Roughness Surface High / Coating Weight High) = $\frac{12}{12+88} = \frac{12}{100}$

$= 0.12$

b. P[Coating Weight High | Surface Roughness High] = $\frac{12}{12+16} = \frac{12}{28}$

$= 0.4285$

c. P [Coating Weight Low | Surface Roughness Low) = $\frac{34}{88+34} = \frac{34}{122}$

$= 0.2787$

Q14. Given That:

Probability of customers use regular Gas: $A_1 = 40\% = 0.4$

Probabilty of Customer use plus Gas: $A_2 = 35\% = 0.35$

Probability of Customer use premium Gas: $A_3 = 25\% = 0.25$

B is the event of customers fill their tanks and given conditional Probabilities are:

$P[B|A_1] = 30\% = 0.3$

$P[B|A_2] = 60\% = 0.6$

$P[B|A_3] = 50\% = 0.5$

a. $P[A_2 \cap B] = P[A_2]\, P[B|A_2]$

$= 0.35 \times 0.6$

$$= 0.21$$

b. Probability that next customer fills the tank is:

$$P[B] = P[A_1]\,P[B|A_1) + P[A_2]\,P[B|A_2) + P[A_3)\,P[B|A_3)$$

$$= 0.4 \times 0.3 + 0.35 \times 0.6 + 0.25 \times 0.5$$

$$= 0.455$$

C. If the next customer fill the tank, the probability that regular gas is requested is

$$P[A_1|B] = \frac{P[A_1] \cdot P[B|A_1)}{P[B]} = \frac{0.4 \times 0.3}{0.455}$$

$$= 0.264$$

If the next customer fill the tank, the probability that plus gas is requested is

$$P[A_2|B] = \frac{P[A_2] \cdot P[B|A_2)}{P[B]} = \frac{0.35 \times 0.6}{0.455}$$

$$= 0.462$$

If the next customer fill the tank, the probability that premium gas is requested is

$$P[A_3|B] = \frac{P[A_3] \cdot P[B|A_3)}{P[B)} = \frac{0.25 \times 0.5}{0.455}$$

$$= 0.274$$