UTM UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
Faculty of Engineering

SECI2143 – PROBABILITY & STATISTICAL DATA ANALYSIS

ASSIGNMENT 2

GROUP 4

SECTION : 06 - 1SECJH

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QUESTION 1

$P(A) = 0.08$

$P(B) = 0.29$

$P(C) = 0.34$

$P(D) = 0.17$

$P(E) = 0.12$

a) average, easy or very easy

$P(A) + P(B) + P(C) = 0.08 + 0.29 + 0.34 = 0.71$

b) average, difficult or very difficult

$P(C \cup D \cup E) = P(C) + P(D) + P(E)$

$= 0.34 + 0.17 + 0.12$

$= 0.63$

c) neither very difficult nor very easy

$P(A' \cup E') = 1 - (P(A) + P(E))$

$= 1 - (0.08 + 0.12)$

$= 1 - 0.2$

$= 0.8$

d) difficult or very easy

$P(A \cup D) = P(A) + P(D)$

$= 0.08 + 0.17$

$= 0.25$

QUESTION 2

a) $P(A) = 0.60$

$P(B) = 0.30$

$P(A \cup B) = 0.80$

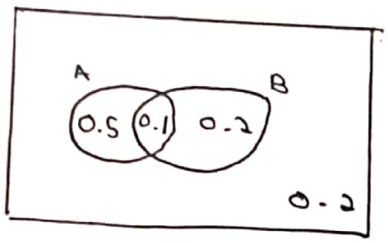
a) $P(A \cap B)$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$0.8 = 0.6 + 0.3 - P(A \cap B)$

$P(A \cap B) = 0.1$

b)



c) $P(A' \cap B) = 0.2$

d) $P(A' \cap B') = 0.2$

e) $P(A' \cup B') = P(A') + P(B') - P(A' \cap B')$

$P(A') = 0.4 = 0.4 + 0.7 - 0.2$

$P(B') = 0.7 = 0.9$

f) ~~$P(A \cap B') = P(A) + P(B') - P($~~

$P(A \cap B') = 0.5$

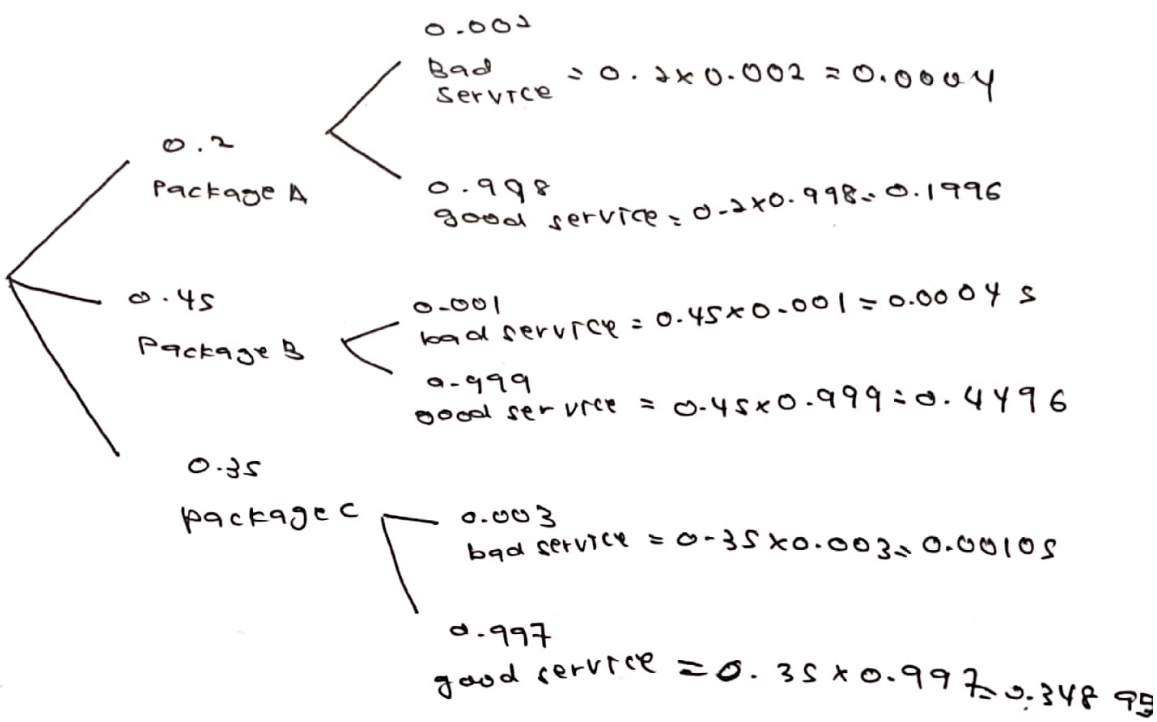
QUESTION 3

20% - A P(A) = 0.002

45% - B P(B) = 0.001

35% - C P(C) = 0.003

a)



b)

good service = 0.1996 + 0.4496 + 0.34895

= 0.99815

c) P(operating smoothly = good service

~~P(B|G)~~

$$P(B|G) = \frac{P(G|B) * P(B)}{P(G)} = \frac{P(0.999) \times (0.45)}{0.99815}$$

= 0.45038

Question 4

a) x is a binomial random variable

b) $b(8; 20, \frac{7}{10}) = \binom{20}{8}\left(\frac{7}{10}\right)^8\left(\frac{3}{10}\right)^{12}$

$= 0.0039$

c) $P(x=7) = \binom{20}{7}\left(\frac{7}{10}\right)^7\left(\frac{3}{10}\right)^{13}$

$= 0.0010$

$P(x=9) = \binom{20}{9}\left(\frac{7}{10}\right)^9\left(\frac{3}{10}\right)^{11}$

$= 0.0120$

$P(x=10) = \binom{20}{10}\left(\frac{7}{10}\right)^{10}\left(\frac{3}{10}\right)^{10}$

$= 0.0308$

$P(7 \leq x \leq 10) = 0.0477$

d) $P(x=3) = \binom{20}{3}\left(\frac{3}{10}\right)^3\left(\frac{7}{10}\right)^{17}$

$= 0.0716$

$P(x=4) = \binom{20}{4}\left(\frac{3}{10}\right)^4\left(\frac{7}{10}\right)^{16}$

$= 0.1304$

$P(x=5) = \binom{20}{5}\left(\frac{3}{10}\right)^5\left(\frac{7}{10}\right)^{15}$

$= 0.1789$

$P(3 \leq x \leq 5) = 0.3809$

Question 5

probability pass $= 0.7$

a) i - $P(X = 3) = (0.7)^1 (0.3)^2 = 0.063$

ii - $P(X = 3) = 0.063$

$P(X = 2) = (0.7)^1 (0.3)^1 = 0.21$

$P(X = 1) = (0.7)^1 (0.3)^0 = 0.7$

$P(X < 4) = 0.063 + 0.21 + 0.7 = 0.973$

iii - $P(X = 5) = (0.7)^1 (0.3)^4 = 5.67 \times 10^{-3}$

b) Mean $= \frac{1}{p} = \frac{1}{0.7} = 1.4286$

Variance $= \left(\frac{1}{p}\right)\left(\frac{1}{p} - 1\right) = (1.4286)(1.4286 - 1)$

$= 0.6122$

Question 6

a) $P(x < 35.8) = P\left(z < \frac{35.8 - 36}{0.1}\right)$

$= P(z < -2)$

$= 0.02275$

$P(x > 36.2) = P\left(z < \frac{36.2 - 36}{0.1}\right)$

$= P(z < 2)$

$= 0.97725$

$= 1 - 0.97725$

$= 0.02275$

$P(\text{out of control}) = 0.02275 + 0.02275$

$= 0.0455$

b) $P(x = 0) = {}^{16}C_0 \times (0.0455)^0 (1 - 0.0455)^{16}$

$= 0.4747$

c) $P(x = 1) = {}^{16}C_1 \times (0.0455)^1 (1 - 0.0455)^{15}$

$= 0.3621$

d) $P(x < 35.8) = P\left(z < \frac{35.8 - 36}{0.4}\right)$

$= P(z < -3)$

$= 0.00135$

$$P(x > 36.2) = P\left(z < \frac{36.2 - 37}{0.4}\right)$$

$$= P(z < -2)$$

$$= 0.02275$$

$$= 1 - 0.02275$$

$$= 0.97725$$

$$P(\text{out of control}) = 0.97725 + 0.00135$$

$$= 0.9786$$

Question 7

a) $X \sim N(28, 8)$

$$P(20 < x < 40) = P\left(\frac{20-28}{8} < Z < \frac{40-28}{8}\right)$$

$$= P(-1 < Z < 1.5)$$

$$= 0.3413 + 0.4332$$

$$= 0.7745$$

$$= 77.45\%$$

b) $P(x < 30) = P\left(Z < \frac{30-28}{8}\right)$

$$= P(Z < 0.25)$$

$$= 1 - P(Z > 0.25)$$

$$= 1 - 0.4013$$

$$= 0.5987$$

$$= 59.87\%$$

c) $P\left(\frac{x-28}{8}\right) = 0.75$

$$x = 8 \times 0.75 + 28$$

$$x = 34 \text{ days}$$