1

a) SEA $A = p(a > 90)$
SEA $B = p(b < 50.000)$

CON $N = 800$

$P(A>90) = \frac{220}{800} = \frac{11}{40} = 0.275$

∴ LA PROBABILIDAD DE QUE UNA CASA SE VENDA EN MÁS DE 90 DÍAS ES DEL 27.5%

b) $p(B<50000) = \frac{100}{800} = \frac{1}{8} = 0.125$

∴ PROB DE VENDER CASA POR MENOS DE \$50K ES DEL 12.5%

c) $P(A>90, B<50K) = \frac{n_{ij}}{N} = \frac{10}{800} = \frac{1}{80} = 0.0125$

∴ PROB DE VENDER UNA CASA EN MAS DE 90 DÍAS Y POR MENOS DE \$50K ES DEL 1.25%

d) $P(A<90 / B<50k) = \frac{n_{ab}}{C_b}$

$C_b = 100$, $n_{ab} = \cancel{P(A<90) = \frac{9}{10} = 0.9}$
$n_{ab} = 90$

$\frac{n_{ab}}{C_b} = \frac{90}{100} = \frac{9}{10} = 0.9\%$

∴ SI LA CASA ES DE MENOS DE \$50K, LA PROB DE QUE SE VENDA EN MENOS DE 90 DÍAS ES DEL 90%.

d) SON A y B INDEPENDIENTES ?

CON $P(A) = 0.275$ y $P(B) = 0.125$

PODEMOS DEMOSTRAR QUE SON INDEPENDIENTES SI

a) $P(A \cap B) = P(A) \cdot P(B)$

ó b) $P(A|B) = P(A)$

ó c) $P(B|A) = P(B)$

DEMOSTRAR a)

$$P(A \cap B) = P(A) \cdot P(B)$$

SEA $P(A \cap B) = 0.0125$ (DEL EJERCICIO c))

$$0.0125 = 0.275 \cdot 0.125$$

$$\neq 0.034375$$

∴ LOS EVENTOS NO SON INDEPENDIENTES

②

$h_1 = [3 \quad 15 \quad 21]$

$h_2 = [1 \quad 5 \quad 6]$

$h_3 = [13 \quad 7 \quad 3]$

a) OBTENER ESPERANZA $\quad E[X] = \frac{1}{N} \cdot \sum_{i=1}^{N} X_i$

$$E[h_1] = (3 + 15 + 21)/3 = 13$$

$$E[h_2] = (1 + 5 + 6)/3 = 4$$

$$E[h_3] = (13 + 7 + 3)/3 = \frac{23}{3}$$

b) OBTENER VARIANZA $\quad \sigma_x^2 \cong \frac{1}{N-1} \sum_{i=1}^{N} (X_i - \hat{\mu}_x)^2$

$$\sigma_{h_1}^2 = \frac{1}{2}\left((3-13)^2 + (15-13)^2 + (21-13)^2\right) = \boxed{84}$$

$$\sigma_{h_2}^2 = \frac{1}{2}\left((1-4)^2 + (5-4)^2 + (6-4)^2\right) = \boxed{7}$$

$$\sigma_{h_3}^2 = \frac{1}{2}\left(\left(13-\frac{23}{3}\right)^2 + \left(7-\frac{23}{3}\right)^2 + \left(3-\frac{23}{3}\right)^2\right) = \boxed{\frac{76}{3}} \approx 25.\overline{3}$$

c) MATRIZ DE COVARIANZA $\quad \Sigma_{X,Y} \cong \frac{1}{N-1} \sum_{i=1}^{N} (X_i - \hat{\mu}_X)(Y_i - \hat{\mu}_Y)$

$$\Sigma_{h_1,h_2} = \frac{1}{2}\left((3-13)(1-4) + (15-13)(5-4) + (21-13)(6-4)\right) = 24$$

$$\Sigma_{h_1,h_3} = \frac{1}{2}\left((3-13)\left(13-\frac{23}{3}\right) + (15-13)\left(7-\frac{23}{3}\right) + (21-13)\left(3-\frac{23}{3}\right)\right) = -46$$

$$\Sigma_{h_2,h_3} = \frac{1}{2}\left((1-4)\left(13-\frac{23}{13}\right) + (5-4)\left(7-\frac{23}{3}\right) + (6-4)\left(3-\frac{23}{3}\right)\right) = -13$$

$$\sigma_{h_1}^2 = 84, \quad \sigma_{h_2}^2 = 7, \quad \sigma_{h_3}^2 = 76/3$$

$$\Sigma = \begin{bmatrix} 84 & 24 & -46 \\ 24 & 7 & -13 \\ -46 & -13 & 76/3 \end{bmatrix}$$

d) MATRIZ DE CORRELACIÓN DE PEARSON

$$\rho_{X_i, X_j} = \frac{\operatorname{cov}(X_i, X_j)}{\sigma_{X_i} \, \sigma_{X_j}}$$

$\sigma_{h_1} = \sqrt{\sigma^2_{h_1}} = \sqrt{84}$ | $\operatorname{cov}(h_1, h_2) = 24$

$\sigma_{h_2} = \sqrt{7}$ | $\operatorname{cov}(h_1, h_3) = -46$

$\sigma_{h_3} = \sqrt{76/3}$ | $\operatorname{cov}(h_2, h_3) = -13$

$\sigma_{h_1} \cdot \sigma_{h_2} = \sqrt{84} \cdot \sqrt{7} \approx 24.25$

$\sigma_{h_1} \cdot \sigma_{h_3} = \sqrt{84} \cdot \sqrt{\frac{76}{3}} \approx 46.13$

$\sigma_{h_2} \cdot \sigma_{h_3} = \sqrt{7} \cdot \sqrt{\frac{76}{3}} \approx 13.32$

$\rho =$

$$\rho = \begin{bmatrix} 1 & \frac{24}{24.25} & \frac{-46}{46.13} \\ \frac{24}{24.25} & 1 & \frac{-13}{13.32} \\ \frac{-46}{46.13} & \frac{-13}{32} & 1 \end{bmatrix}$$

$$\rho = \begin{bmatrix} 1 & 0.989 & -0.997 \\ +0.989 & 1 & -0.976 \\ -0.997 & -0.976 & 1 \end{bmatrix}$$