Mashuke Alam Jim
011-181-145

Fall-18

① (a) $P(X_1 = D) = 1$

$P(X_1 = C) = 0$

$P(X_1 = M) = 0$

$P(X_2 = D) = P(X_2 = D, X_1 = C) + P(X_2 = D, X_1 = M)$.

$= P(X_2 = D \mid X_1 = D)\, P(X_1 = D) + P(X_2 = D \mid X_1 = C)$

$P(X_1 = C)$

$+ P(X_2 = D \mid X_1 = M)\, P(X_1 = M)$

$= 0.4 \times 1 + 0.5 \times 0 + 0.1 \times 0 = 0.4$.

$P(X_2 = C) = P(X_2 = C, X_1 = D) + P(X_2 = C, X_1 = C) +$

$P(X_2 = C, X_1 = M)$

$= 0.2$

$P(X_2 = M) = 1 - (0.4 + .2) = 0.4$

$P(X_3 = C) = P(X_3 = C \mid X_2 = D)\, P(X_2 = D) + P(X_3 = C \mid$

$X_2 = C)$.

$P(X_2 = C)$

$+ P(X_3 = C \mid X_2 = M)\, P(X_2 = M)$

$= 0.3$.

(Answer).

(b) $P_\infty(X_\infty = D) = P(D|D) \cdot P_\alpha(D) + P(D|C) P_\alpha(C) + P(D|M) P_\alpha(M)$

$\Rightarrow P_\alpha(D) = 0.4 P_\alpha(D) + 0.5 P_\alpha(C) + 0.1 P_\alpha(M)$

$\Rightarrow 0.6 P_\alpha(D) - 0.5 P_\alpha(C) - 0.1 P_\alpha(M) = 0$ ——— (1).

~~$P_\alpha(C) = 0.2 P_\alpha(D) +$~~

$P_\alpha(C) = P_\alpha(D) \cdot P(C|D) + P(C|C) P_\alpha(C) + P(C|M) \cdot P_\infty(M)$

$P_\alpha(C) = 0.2 P_\alpha(D) + 0.3 P_\alpha(C) + 0.1 P_\alpha(C)$.

$P_\alpha(D) + P_\alpha(C) + P_\alpha(M) = 1$

$P_\alpha(D) = 0.3176$

$P_\alpha(C) = 0.30588$

$P_\alpha(M) = 0.37648$.

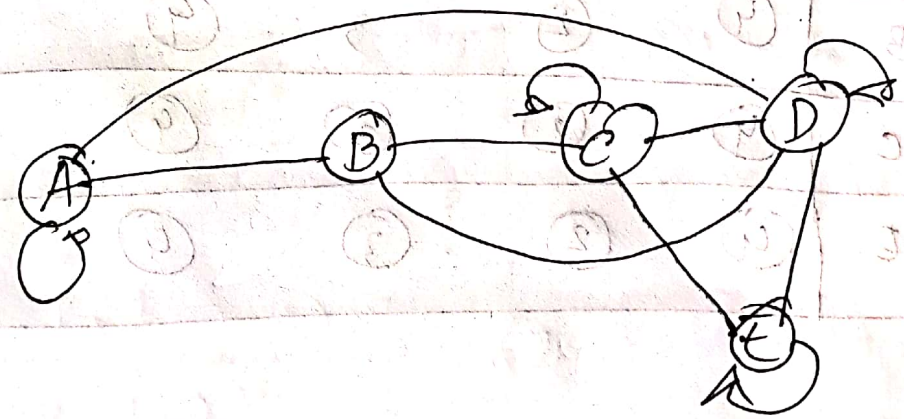
Spring 2020

⑤ Variable (A, B, C, D, E)

Domain (F_1, F_2, F_3, F_4).

Constraints:

$F_1 \neq A$ and $F_1 \neq E$	$A \neq D$
$F_3 \neq D$	$B \neq D$
$F_4 \neq C$ and $F_4 \neq E$	$C \neq D$
$D \neq E$	$C \neq E$
$A \neq B$	
$B \neq C$	

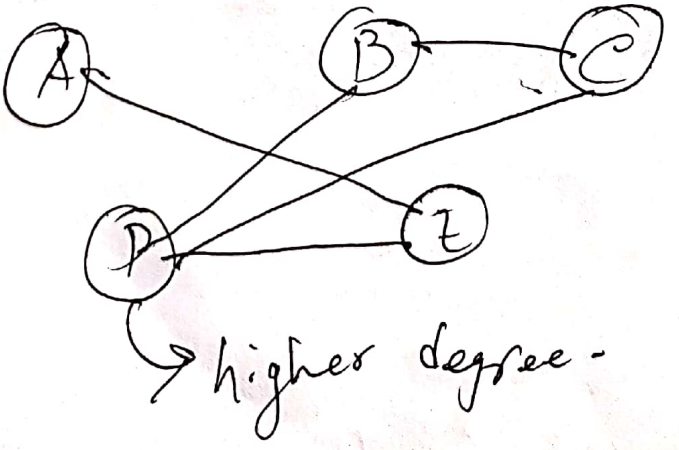


(5) Variable: {A, B, C, D, E}

Domain: {{3,4}, {2,3,4}, {1,3,4}, {1,2,4}, {1,3,2,4}}.

Constraints: {C<D, B<C, A≠E, E≠D, B<D}.

	A	B	C	D	E
~~B~~	3, 4	2, 3 4	1, 3, 4	1, 2 4	1, 2, 3, 4
A	(4) ~	2, 3 4	1, 3, 4	1, 2, 4	1, 2, 3
D	(4) ✓	2, 3	1, 3	(4) ✓	1, 2, 3
B	(4)	(2)	3	(4)	1, 2, 3
C	(4)	(2)	(3)	(4)	1, 2, 3
E	(4)	(2)	(3)	(4)	(1)



higher degree.

Summer – 2019

⑥ Lens Type :-

None	7/15
Soft	5/15
Hard	3/15

	None	Soft	Hard
Young	2/7	2/5	1/3
Middle	2/7	2/5	1/3
old	3/7	1/5	1/3

	None	Soft	Hard
Near	4/7	2/5	2/3
Far	3/7	3/5	1/3

Astigmation :-

	None	soft	hard
Yes	3/7	0	1
No	4/7	5/5	0/3

	None	Soft	Hard
Produces	1	0	0
Normal	0	1	1

None → N
Soft → S
Hard → H
OW → O
Far → F
Yes → Y
Normal → NO

$P(O, F, Y, NO) = ?$

$$P(N|O, F, Y, NO) = \frac{P(N, O, F, Y, NO)}{P(O, F, Y, NO)}$$

$$P(N, O, F, Y, NO) = P(N)\, P(O|N)\, P(F|N)\, P(Y|N)\, P(NO|N)$$

$$= \frac{2+1}{18} \times \frac{3+1}{10} \times \frac{3+1}{9} \times \frac{3+1}{9} \times \frac{1}{9}$$

$$= 0.0039.$$

$$P(O, I, Y, NO) = P(NB, F, Y, NO) + P(S, O, F, Y, NO) + P(H, O, F, Y, NO)$$

$$P(S, O, F, Y, NO) = P(S)\, P(O|S)\, P(F|S)\, P(Y|S)\, P(NO|S)$$

$$= \frac{5+1}{18} \times \frac{1+1}{8} \times \frac{3+1}{7} \times \frac{3+1}{7} \times \frac{5+1}{7}$$

$$= 0.00583$$

$$P(H, O, F, Y, NO) = P(H) \cdot P(O|H)\, P(F|H) \cdot P(Y|H) \cdot P(NO)$$

$$= \frac{3+1}{18} \times \frac{1+1}{6} \times \frac{1+1}{5} \times \frac{3+1}{5} \times \frac{3+1}{5}$$

$$= 0.01896.$$

$$P(O, F, Y, NO) = 0.0039 + 0.00583 + 0.01896$$

$$= 0.02867$$

$$P(N|O, F, Y, NO) = 0.136$$

$$P(S|O, F, Y, NO) = 0.0234$$

$$P(H|O, F, Y, NO) = 0.6615$$

Answer (Hard should be suggested).

Spring 19

$P(F) = \frac{1}{2}$

$P(H|F) = \frac{1}{2}$

$P(\bar{F}) = \frac{1}{2}$

$P(H|\bar{F}) = 1$

$$P(F|H) = \frac{P(H|F) \cdot P(F)}{P(H)} = \frac{(0.5)^2}{(0.5)^2 + 0.5}$$

$$= \frac{1}{3}$$

(Answer)

(4)

Gender	Type	Sub	P
Male	Project	Soft	5/100
Male	Project	AI	10/100
Male	Project	Net	5/100
Male	Thesis	Soft	10/100
Male	Thesis	AI	15/100
Male	Thesis	Net	85/100
Female	project	Soft	12/100
Female	〃	AI	10/100
Female	〃	Net	8/100
Female	Thesis	Soft	10/100
Female	〃	AI	5/100
Female	〃	Net	5/100

i) $P(\text{This}) = \frac{10}{100} + \frac{15}{100} + \frac{5}{100} + \frac{10}{100} + \frac{5}{100} + \frac{5}{100}$

$= 0.5$

ii)

Soft	15/100
AI	25/100
Net	10/100

$P(AI' \mid \text{Male}) = 1 - P(AI \mid \text{Male})$

$= 1 - 0.5$

$= 0.5$