Assignment 3

Section : 2
Course : SEC I 1013 (Discrete structure)
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Question 1

(a)

$m(k-1) < n$ $\qquad$ m = 101 (pigeonhole)

$n > 101$ $\qquad$ k = 2

n = 102 (pigeons)

※

(b) $\qquad$ k = 6

m = 5 (pigeonhole) $\qquad$ n > m(k-1)

n = ? (pigeons) $\qquad$ n > 5(5)

n > 25

n = 26

※

Question 2

A = purchase Brand 1   E = purchase any extended warranty

B = purchase Brand 2

C = purchase extended warranty (Brand 1)

D = purchase extended warranty (Brand 2)
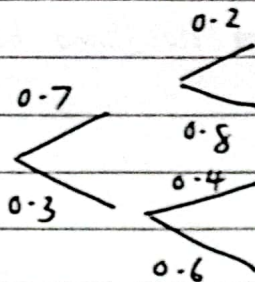
(a) $P(A) = 0.7$

(b) $P(B) = 0.3$

(c) $P(C|A) = 0.2$

(d) $P(C \cap A) = P(C|A) \cdot P(A)$

$= 0.2 \cdot 0.7$

$= 0.14$ �

(e) $P(D \cap B) = P(D|B) \cdot P(B)$

$= 0.4 \cdot 0.3$

$= 0.12$

(f)

```
         0.2
      0.7 <
         0.8
   <
      0.3 <
         0.4
         0.6
```

$P(E) = [0.7 \cdot 0.2] + [0.3 \cdot 0.4]$

$= 0.26$ ✖

(g) $P(A|E) = \dfrac{P(A \cap E)}{P(E)}$

$= \dfrac{0.14}{0.26}$

$= 0.5385$ ✖

Question 3

(a) vertices = points on a polygon where two rays or line segment meet

```
  B  1  A
  4 [  ] 2      ∴ A, B, C, D are vertices
  C  3  D
```
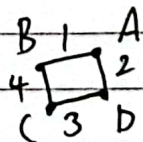
(b) edges = a line which connects two endpoints

∴ based on the diagram above, 1, 2, 3, 4 are the edges
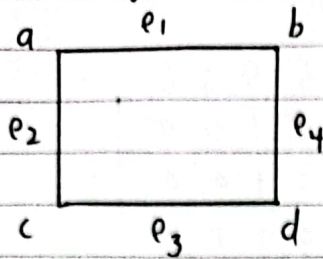
(c) Adjacent vertices

```
    a    e₁    b
      [      ]
    e₂        e₄
    c    e₃    d
```
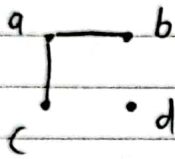
∴ a and are adjacent vertices since both of them are connected by edge e_1
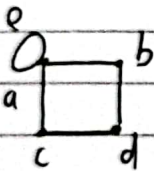
(d) Incident Edge

a e_1 b

e_2 e_4

c e_3 d

∴ e_1 and e_2 are incident edges since they share a common vertex, a ✗

(e) Isolated Vertex

a ——— b

c   • d
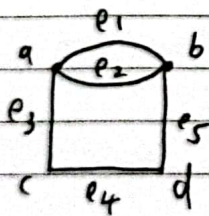
∴ d is a isolated vertex since it is not connected by any edges

(f) Loop

e

a   b

c   d

∴ e is a loop, an edge that connects vertex a to itself

(g) Parallel edges

e_1

a e_2 b

e_3 e_5

c e_4 d

∴ e_1 and e_2 are parallel edges since they share the same set of vertex

Question 4

$d(v_1) = 3$

$d(v_2) = 2$

$d(v_3) = 3$

$d(v_4) = 5$

$d(v_5) = 1$

Question 5

(i) Incidence Matrix

	a	b	c	d	e	f	g	h	i	k
1	1	2	1	1	0	0	0	0	0	0
2	0	0	0	0	1	0	0	0	0	0
3	1	0	1	0	0	1	1	1	0	0
4	0	0	0	1	1	1	0	0	1	0
5	0	0	0	0	0	0	0	1	0	1
6	0	0	0	0	0	0	1	0	1	1

(ii) Adjacency Matrix

	1	2	3	4	5	6
1	1	0	2	1	0	0
2	0	0	0	1	0	0
3	2	0	0	1	1	1
4	1	1	1	0	0	1
5	0	0	1	0	0	1
6	0	0	1	1	1	0

Question 6

$f(A) = 6$
$f(B) = 5$
$f(C) = 4$
$f(D) = 3$
$f(E) = 2$
$f(F) = 1$

$A_Y =$

	A	B	C	D	E	F
A	0	1	0	1	0	0
B	1	0	0	1	1	1
C	0	0	0	1	1	1
D	1	1	1	0	0	1
E	0	1	1	0	0	0
F	0	1	1	1	0	0

$A_Z =$

	6	5	4	3	2	1
6	0	1	0	1	0	0
5	1	0	0	1	1	1
4	0	0	0	1	1	1
3	1	1	1	0	0	1
2	0	1	1	0	0	0
1	0	1	1	1	0	0

- Graph Y and Z are isomorphic.
- They have the same number of edges and vertices and are simple graphs
- the corresponding vertices have the same degree

Question 7

(i)   p , e5 , t
      p , e1 , q , e6 , s , e4 , t
      p , e1 , q , e2 , r , e7 , t
      p , e1 , q , e2 , r , e3 , s , e4 , t
      p , e1 , q , e6 , s , e3 , r , e7 , t

(ii) p , e5 , t
      p , e1 , q , e6 , s , e4 , t
      p , e1 , q , e2 , r , e7 , t
      p , e , q , e2 , r , e3 , s , e4 , t
      p , e , q , e6 , s , e3 , r , e7 , t

(iii) shortest = p , e5 , t
      longest = p , e1 , q , e6 , s , e3 , r , e7 , t

(iv) shortest = p , e5 , t
      longest = p , e1 , q , e6 , s , e3 , r , e7 , t