UTM

UNIVERSITI TEKNOLOGI MALAYSIA

ASSIGNMENT 3

SECI1013

STRUKTUR DISKRIT (DISCRETE STRUCTURE)

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SECTION: 02

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Assignment 3

1. (a) pigeonholes = 101

pigeon > pigeonholes

pigeon > 101

pigeon = 102

∴ let say 101 students in the class will get mark from 1 of the set (0-100), then the mark will be repeated when 1 more student in that class

So, should be at least 102 students in the class.

(b) pigeonholes (m) = 5

$n = m(k-1)+1$

$n = 5(6-1)+1$

$n = 26$

∴ Should be at least 26 students for 6 students to get the same grade.

2. Percentage of Customers Purchasing (P)

Percentage who Extended Warranty

(a) P(Brand 1) = 0.7

(b) P(Brand 2) = 0.3

(c) P(W | Brand 1) = 0.2

(d) $P(W \mid \text{Brand 1}) = \frac{P(W \cap \text{Brand 1})}{P(\text{Brand 1})}$

$0.2 = \frac{P(W \cap \text{Brand 1})}{0.7}$

$P(W \cap \text{Brand 1}) = 0.14$

(e) P(W | Brand 2) = 0.4

$P(W \mid \text{Brand 2}) = \frac{P(W \cap \text{Brand 2})}{P(\text{Brand 2})}$

$0.4 = \frac{P(W \cap \text{Brand 2})}{0.3}$

$P(W \cap \text{Brand 2}) = 0.12$

(f) $P(W) = P(W \cap \text{Brand 1}) + P(W \cap \text{Brand 2})$

$= 0.14 + 0.12$

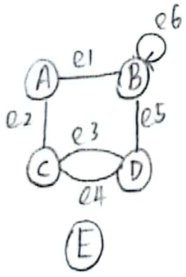
$= 0.26$

(g) $P(\text{Brand 1} \mid W) = \frac{P(W \mid \text{Brand 1})\,P(\text{Brand 1})}{P(W \mid \text{Brand 1})\,P(\text{Brand 1}) + P(W \mid \text{Brand 2})\,P(\text{Brand 2})}$

$= \frac{0.2 \times 0.7}{0.2 \times 0.7 + 0.4 \times 0.3}$

$= 0.5385$

3.



(a) Vertices is point on graph (A, B, C, D)

(b) Edges is connection between vertices. (e1, e2, e3, e4, e5, e6)

(c) Adjacent vertices is two vertex connected by an edge. (A, B connected by e1)

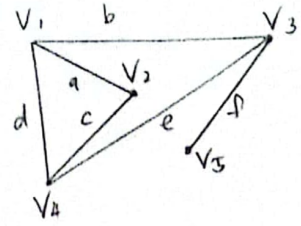
(d) Incident edge is two edges that share a common vertex (e1 and e2 are incident edge as A is one of their common endpoint).

(e) Isolated vertex is not connected to any other vertex by an edge (E)

(f) Loop is a edge that connects to a vertex itself. (e6)

(g) Parallel edges is two edges that connect the same two vertex. (e3 and e4)

4.



$\deg(V_1) = 3$
$\deg(V_2) = 2$
$\deg(V_3) = 3$
$\deg(V_4) = 3$
$\deg(V_5) = 1$

5. (i) Incidence matrix

$$I = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \end{array} \begin{array}{c} \begin{array}{cccccccccc} a & b & c & d & e & f & g & h & i & k \end{array} \\ \begin{bmatrix} 1 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix} \end{array}$$

(ii) Adjacency Matrix

$$A = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \end{array} \begin{array}{c} \begin{array}{cccccc} 1 & 2 & 3 & 4 & 5 & 6 \end{array} \\ \begin{bmatrix} 1 & 0 & 2 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 2 & 0 & 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix} \end{array}$$

6. 1. Both have same number of vertices (6) and same number of edges (9).
2. Both have 2 vertices with degree 4, 2 vertices with degree 3 and 2 vertices with degree 2.

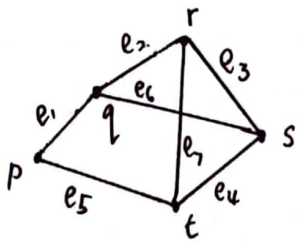
$f(a) = 6$
$f(b) = 5$
$f(c) = 4$
$f(d) = 3$
$f(e) = 2$
$f(f) = 1$

isomorphic

$$A_y = \begin{array}{c} \\ A \\ B \\ C \\ D \\ E \\ F \end{array} \begin{array}{c} \begin{array}{cccccc} A & B & C & D & E & F \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \end{bmatrix} \end{array}$$

$$A_z = \begin{array}{c} \\ 6 \\ 5 \\ 4 \\ 3 \\ 2 \\ 1 \end{array} \begin{array}{c} \begin{array}{cccccc} 6 & 5 & 4 & 3 & 2 & 1 \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \end{bmatrix} \end{array}$$

7.



(i) Path:

$\{p, e_5, t\}$
$\{p, e_1, q, e_2, r, e_3, s, e_4, t\}$
$\{p, e_1, q, e_2, r, e_7, t\}$
$\{p, e_1, q, e_6, s, e_4, t\}$
$\{p, e_1, q, e_6, s, e_3, r, e_7, t\}$

(ii) Trails

{p, e_5, t}

{p, e_1, q, e_2, r, e_3, s, e_4, t}

{p, e_1, q, e_2, r, e_7, t}

{p, e_1, q, e_6, s, e_4, t}

{p, e_1, q, e_6, s, e_3, r, e_7, t}

{p, e_5, t, e_4, s, e_6, q, e_2, r, e_7, t}

{p, e_5, t, e_7, r, e_3, s, e_4, t}

{p, e_5, t, e_7, r, e_2, q, e_6, s, e_4, t}

{p, e_5, t, e_4, s, e_3, r, e_7, t}

(iii) shortest path / Shortest trail

{p, e_5, t}

Longest path

{p, e_1, q, e_6, s, e_3, r, e_7, t}

{p, e_1, q, e_2, r, e_3, s, e_4, t}

Longest trail

{p, e_5, t, e_4, s, e_3, r, e_7, t}

{p, e_5, t, e_7, r, e_2, q, e_6, s, e_4, t}