UNIVERSITI TEKNOLOGI MALAYSIA

FACULTY OF COMPUTING

SEMESTER 1 2024/2025

SECI 1013 DISCRETE STRUCTURE

SECTION 03

ASSIGNMENT 3

LECTURER: DR. MUHAMMAD ALIIF BIN AHMAD

Student name	Matric Number
TOH SHEE THONG	A24CS0309
NUR ALIA ATHIRAH BINTI SUZUDDIN	A24CS0153
LEE PEI YUAN	A24CS0262
MUHAMMAD ALIFF BIN HELMI	A24CS0272

Assignment 3 (Chapter 3 and 4)

1. $P(M) = 3P(C)$

$P(C) = 2P(B)$

$P(B) = P(P)$

$P(M) + P(C) + P(B) + P(P) = 1$

$3P(C) + 2P(B) + P(B) + P(B) = 1$

$3(2P(B)) + 4P(B) = 1$

$6P(B) + 4P(B) = 1$

$10P(B) = 1$

$P(B) = \frac{1}{10}$

$P(P) = \frac{1}{10}$

$P(C) = 2(\frac{1}{10}) = \frac{2}{10} = \frac{1}{5}$

$P(M) = 3(\frac{1}{5}) = \frac{3}{5}$

ii) $P(M \cup B) = P(M) \times P(B)$

$= \frac{3}{5} + \frac{1}{10}$

$= \frac{7}{10}$

2. i) $P(A \cup B) = P(A) + P(B)$

$= 0.4 + 0.5$

$= 0.9$

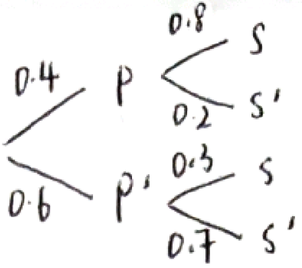
ii) $P(A^c) = 1 - 0.4$

$= 0.6$

iii) $P(A^c \cap B) = P(B) = 0.5$

3. $\frac{1}{100} + \frac{1}{100} + \frac{1}{100} = \frac{3}{100} = 0.03$

4.



$P(P') = (0.6 \times 0.3) + (0.6 \times 0.7)$

$= 0.6$

ii) $P(P \mid S) = \frac{P(P \cap S)}{P(S)}$

$= \frac{0.4(0.8)}{0.4(0.8) + 0.6(0.3)}$

$= 0.64$

5. $\frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$

Chapter 4

i) a. points (A)

b. lines that connected 2 points (A) — (B) edge

c. vertices that connected by an edge.

(A) — (B) means that A and B are adjacent vertices.

d. edge that connect 2 vertices.

(A) $\xrightarrow{e}$ (B) means that e is incident to A and B.

e. vertices that doesn't connect with others

(A) — (B) (C) means that C is isolated vertex.

f. edge that start and end in one vertex.

(A) e, means that edge e is a loop.

g. 2 edge connected with 2 same vertices.

(A) e_1 e_2 (B), means that e_1 and e_2 are parallel edges.

1. a) i) $d(V_1) = 1$

$d(V_2) = 4$

$d(V_3) = 3$

$d(V_4) = 2$

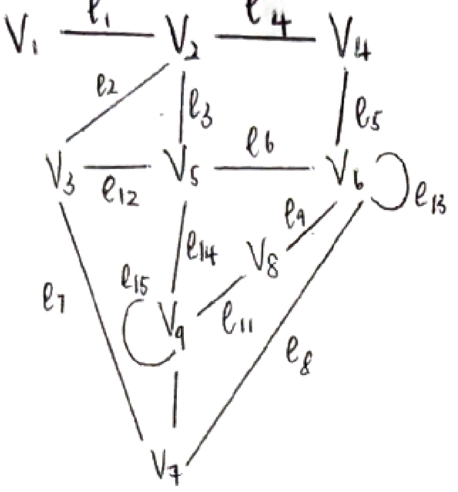
$d(V_5) = 4$

$d(V_6) = 6$

$d(V_7) = 3$

$d(V_8) = 2$

$d(V_9) = 5$



ii) adjacent matrix :

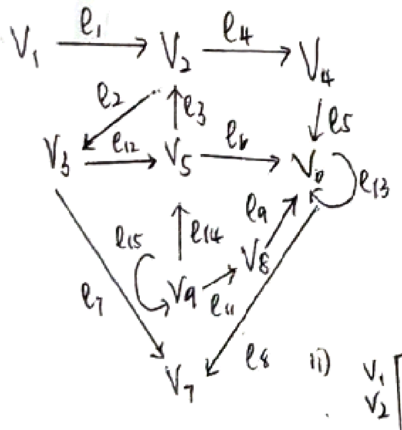
$$\begin{array}{c} \begin{array}{ccccccccc} V_1 & V_2 & V_3 & V_4 & V_5 & V_6 & V_7 & V_8 & V_9 \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 & 1 \end{bmatrix} \end{array}$$

ii) incident matrix :

$$\begin{array}{c|c} & \begin{array}{ccccccccccccccc} e_1 & e_2 & e_3 & e_4 & e_5 & e_6 & e_7 & e_8 & e_9 & e_{10} & e_{11} & e_{12} & e_{13} & e_{14} & e_{15} \end{array} \\ \begin{array}{c} V_1 \\ V_2 \\ V_3 \\ V_4 \\ V_5 \\ V_6 \\ V_7 \\ V_8 \\ V_9 \end{array} & \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 & 1 & 0 & 1 & 1 & 0 & 0 & 0 & 2 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 1 & 2 \end{bmatrix} \end{array}$$

ii)

	V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8	V_9
In	0	2	1	1	3	4	2	1	2
Out	1	2	2	1	1	2	1	1	3



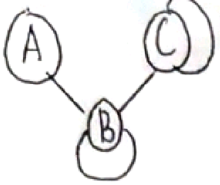
ii) adjacent matrix :

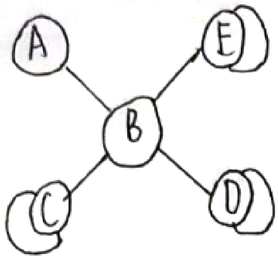
$$\begin{array}{c} \begin{array}{ccccccccc} V_1 & V_2 & V_3 & V_4 & V_5 & V_6 & V_7 & V_8 & V_9 \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 1 \end{bmatrix} \end{array}$$

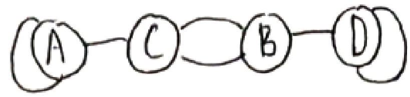
incident matrix :

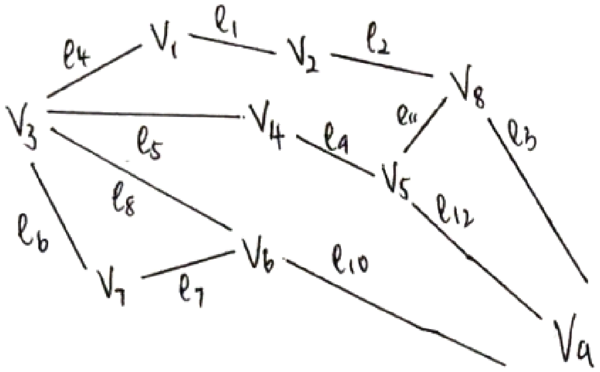
ii)

$$\begin{array}{c|c} & \begin{array}{ccccccccccccccc} e_1 & e_2 & e_3 & e_4 & e_5 & e_6 & e_7 & e_8 & e_9 & e_{10} & e_{11} & e_{12} & e_{13} & e_{14} & e_{15} \end{array} \\ \begin{array}{c} V_1 \\ V_2 \\ V_3 \\ V_4 \\ V_5 \\ V_6 \\ V_7 \\ V_8 \\ V_9 \end{array} & \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 1 & -1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & -1 & -1 & 0 & 1 & -1 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -1 & -1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 1 & 0 & 0 & 1 & 1 \end{bmatrix} \end{array}$$

1) a) 

b) 

c) 

4) i) 

i) $\{V_1, e_1, V_2, e_2, V_8, e_3, V_9\}$

$\{V_1, e_1, V_2, e_2, V_8, V_{11}, V_5, e_{12}, V_9\}$

$\{V_1, e_1, V_2, e_2, V_8, V_{11}, V_5, e_9, V_4, e_5, V_3, e_6, V_7, e_7, V_6, e_{10},$

$\{V_1, e_4, V_3, e_8, V_6, e_{10}, V_9\}$

$\{V_1, e_1, V_2, e_2, V_8, e_{11}, V_5, e_9, V_4, e_5, V_3, e_8, V_6, e_{10}, V_9\}$

$\{V_1, e_4, V_3, e_5, V_4, e_9, V_5, e_{11}, V_8, e_3, V_9\}$

$\{V_1, e_{11}, V_3, e_5, V_4, e_9, V_5, e_{12}, V_9\}$

ii) $\{V_1, e_1, V_2, e_2, V_8, e_3, V_9\}$

$\{V_1, e_1, V_2, e_2, V_8, V_{11}, V_5, e_{12}, V_9\}$

$\{V_1, e_1, V_2, e_2, V_8, V_{11}, V_5, e_9, V_4, e_5, V_3, e_6, V_7, e_7, V_6, e_{10}, V_9\}$

$\{V_1, e_4, V_3, e_8, V_6, e_{10}, V_9\}$

$\{V_1, e_1, V_2, e_2, V_8, e_{11}, V_5, e_9, V_4, e_5, V_3, e_8, V_6, e_{10}, V_9\}$

$\{V_1, e_4, V_3, e_5, V_4, e_9, V_5, e_{11}, V_8, e_3, V_9\}$

$\{V_1, e_{11}, V_3, e_5, V_4, e_9, V_5, e_{12}, V_9\}$

$\{V_1, e_4, V_3, e_6, V_7, e_7, V_6, e_2, V_3, e_5, V_4, e_9, V_5, e_{12}, V_9\}$

iii) and iv)

shortest: $\{V_1, e_1, V_2, e_2, V_8, e_3, V_9\}$

$\{V_1, e_4, V_3, e_8, V_6, e_{10}, V_9\}$

longest: $\{V_1, e_1, V_2, e_2, V_8, e_{11}, V_5, e_9, V_4, e_5, V_3, e_6, V_7, e_7, V_6, e_{10}, V_9\}$

5 a) $d(A) = 4$
$d(B) = 2$
$d(C) = 4$
$d(D) = 2$
$d(E) = 2$
$d(F) = 4$

No. Since all the degrees are even.

b) Euler circuit : {A, B, C, D, F, C, A, F, E, A}

c) Hamilton circuit : {A, B, C, D, F, E, A}

d) Euler circuit passes through edge exactly one but Hamilton doesn't need to connect all the edges.