SECI 1013 : DISCRETE STRUCTURE

SESSION 20242025 SEMESTER 1

ASSIGNMENT 3

GROUP MEMBER :

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QUESTION 1

a) $|S| = 500$

Let A = Student selected studied in private university

$|A| = 175$

$P(A) = \frac{|A|}{|S|} = \frac{175}{500} = \frac{7}{20} = 0.35$

b) $|S| = 500$

Let B = student selected studied in local public university

$|B| = 325$

$P(B) = \frac{|B|}{|S|} = \frac{325}{500} = \frac{13}{20} = 0.65$

c) They are mutually exclusive because $P(A) + P(B) = 1$, then $P(A) \wedge P(B) = 0$.
A student cannot be choose as a student from both a private university and local university at a same time.

QUESTION 1

d) (i) Let C = student majored in a business-related field.

$$P(C|A) = \frac{60}{100} = 0.60$$

$$P(A) = \frac{35}{100} = 0.35$$

$$P(C|A) = \frac{P(A \cap C)}{P(A)}$$

$$0.60 = \frac{P(A \cap C)}{0.35}$$

$$P(A \cap C) = \frac{21}{100} = 0.21$$

(ii) ~~$P(A|C) = \frac{70}{100} = 0.70$~~

~~$P(A|C) = \frac{P(A \cap C)}{P(C)}$~~

~~$0.70 = \frac{0.21}{P(C)}$~~

~~$P(C) = 0.30 = \frac{30}{100}$~~

$$P(C) = P(C|A)P(A) + P(C|B)P(B)$$

$$= 0.60 \times 0.35 + 0.40 \times 0.65$$

$$= 0.47$$

$$= \frac{47}{100}$$

(iii) $P(C|B) = \frac{40}{100} = 0.40$

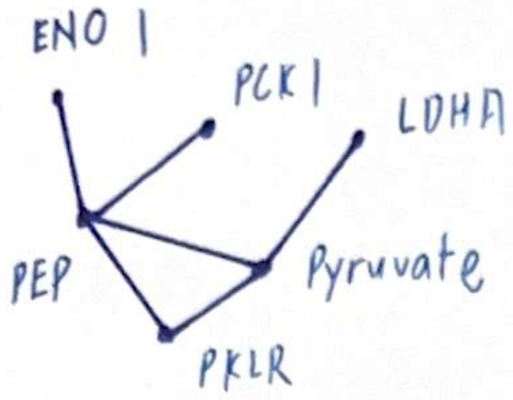
$$P(B|C) = \frac{P(C|B)P(B)}{P(C|B)P(B) + P(C|A)P(A)}$$

$$= \frac{0.40 \times 0.65}{0.40 \times 0.65 + 0.60 \times 0.35}$$

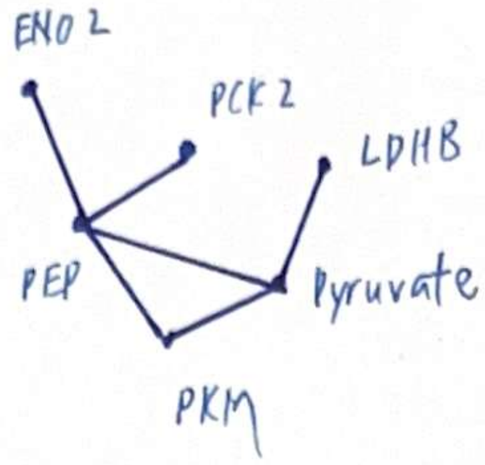
$$= 0.5531914894$$

$$\approx 0.55$$

2.



GLUCONEOGENESIS



GLYCOLYSIS

$f(\text{ENO 1}) = \text{ENO 2}$

$f(\text{PEP}) = \text{PEP}$

$f(\text{PCK 1}) = \text{PCK 2}$

$f(\text{PKLR}) = \text{PKM}$

$f(\text{pyruvate}) = \text{Pyruvate}$

$f(\text{LDHA}) = \text{LDHB}$

$A_{GLU} =$

	ENO 1	PEP	PCK 1	PKLR	Pyruvate	LDHA
ENO 1	0	1	0	0	0	0
PEP	1	0	1	1	1	0
PCK 1	0	1	0	0	0	0
PKLR	0	1	0	0	1	0
Pyruvate	0	1	0	1	0	1
LDHA	0	0	0	0	1	0

$A_{GLY} =$

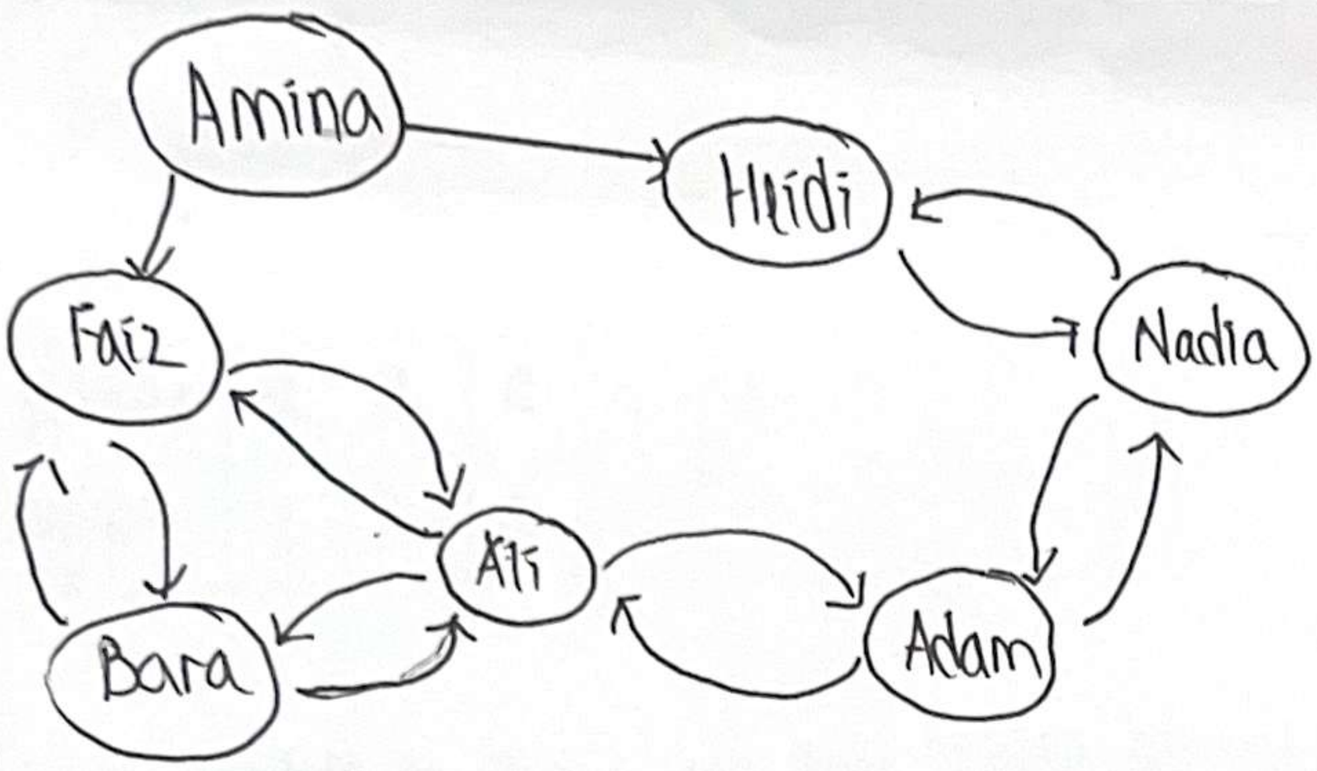
	ENO 2	PEP	PCK 2	PKM	Pyruvate	LDHB
ENO 2	0	1	0	0	0	0
PEP	1	0	1	1	1	0
PCK 2	0	1	0	0	0	0
PKM	0	1	0	0	1	0
Pyruvate	0	1	0	1	0	1
LDHB	0	0	0	0	1	0

$\therefore$ Graphs of GLUCONEOGENESIS and GLYCOLYSIS are isomorphic because there is a one-to-one, onto function f from the vertices of GLUCONEOGENESIS to the vertices of GLYCOLYSIS

$\therefore$ A_{GLU} and A_{GLY} are the same, GLUCONEOGENESIS and GLYCOLYSIS are isomorphic.

Qulstion 3

(a)

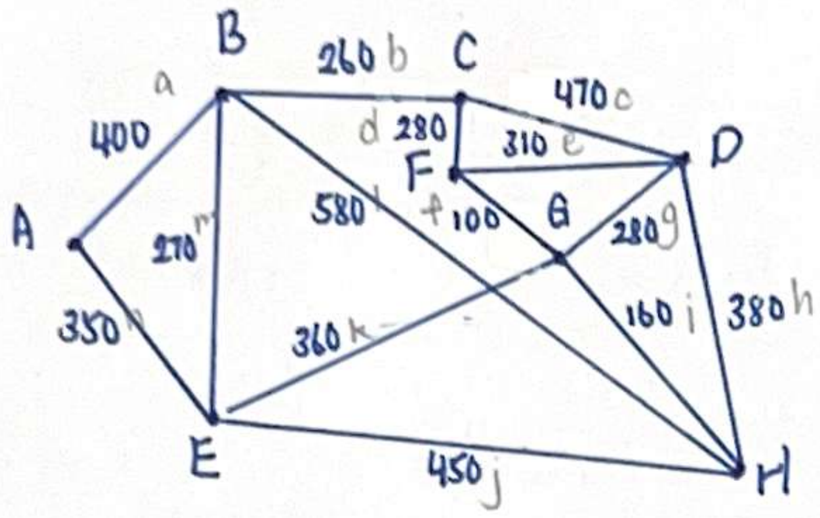


(b) Yes, it's possible the message delivered to everybody exactly ~~one~~ once

Amina → Heidi → Nadia → Adam → Ali → Bara → Faiz

(c) Hamiltonian Path, every vertex appears exactly once and it doesn't include all edges.

d) i.



ii.

Vertices	A	B	C	D	E	F	G	H
Degrees	2	4	3	4	4	3	4	4

iii. It is possible to plan a trip that travels all sections of the railway line without travelling on any section of the line mure than once.
The specific station to start should be Chedar and ends at Fern because for Euler trail. it must start at one of the odd-degree vertex and ends at other vertex with odd degree.
Pathway: C, d, F, e, D, c, C, b, B, a, A, n, E, m, B, l, H, j, E, k, G, g, D, h, H, i, G, f, F

iv. Line between Chedar and Fern can be closed so all the vertices will have even degrees and Euler circuit exists
Pathway: A, a, B, b, C, c, D, e, F, f, G, g, D, h, H, i, G, k, E, m, B, l, H, j, E, n, A

v.

S	N	L(A)	L(B)	L(C)	L(D)	L(E)	L(F)	L(G)	L(H)
{}	{A,B,C,D,E,F,G,H}	0	∞	∞	∞	∞	∞	∞	∞
{A}	{B,C,D,E,F,G,H}		400	∞	∞	350	∞	∞	∞
{A,E}	{B,C,D,F,G,H}		400	∞	∞		∞	710	800
{A,B,E}	{C,D,F,G,H}			660	∞		∞	710	800
{A,B,C,E}	{D,F,G,H}				1130		940	710	800
{A,B,C,E,G}	{D,F,H}				990		940		800
{A,B,C,E,G,H}	{D,F}				990		940		
{A,B,C,E,F,G,H}	{D}				990				

Shortest route : A → E → G → D

Minimum total length : 350 + 360 + 280 = 990