Assingment 3.

1. Father , mother , 2 boys , 3 girls

(a) there are no restrictions.

$7! = 5040$ ways

(b) parents stands together

FM B1 B2 G1 G2 G3

$= {}^6P_1 \times {}^5P_5 \times {}^2P_2$

$= 1440$ ways

(c) all female stand together

MG1G2G3 F B1 B2

$= 4! \times 3!$

$= 144$ ways.

2. TUESDAY

(a) 4 letter are used at a time

$= {}^7P_4$

$= 840$ ways

(b) all letter be used at a time

$= {}^7P_7$

$= 5040$ ways

(c) all letter are used but first letter vowel

Vowel = 3

$6! = 720$

$= 3 \times 720$

$= 2160$ ways.

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3. registration number = 3 letters, four single digit numbers.

(A) letter cannot be repeated.

26 letter	10 digit
$26 \cdot 25 \cdot 24$	$10 \cdot 10 \cdot 10 \cdot 10$
$= 26 \times 25 \times 24$	$= 10 \times 10 \times 10 \times 10$
$= 15,600$	$= 10,000$

Total registration: $= 15,600 \times 10,000$

$= 156,000,000$

(b) neither letter nor number can be repeated.

26 letter	10 digit
$26 \cdot 25 \cdot 24$	$= 10 \cdot 9 \cdot 8 \cdot 7$
$= 26 \times 25 \times 24$	$= 10 \times 9 \times 8 \times 7$
$= 15,600$	$= 5,040$

Total registration $= 15,600 \times 5,040$

$= 78,624,000$

4. committe of 7 = 9 boys & 4 girls.

(A) exactly 3 girls.

$= {}^9C_4 \times {}^4C_3$

$= 504$ ways

(b) At least 3 girls.

$({}^9C_4 \times {}^4C_3) + ({}^9C_3 \times {}^4C_4)$

$= 504 + 84$

$= 588$ ways

(c) at most 3 girls.

$= ({}^9C_4 \times {}^4C_0) + ({}^9C_6 \times {}^4C_1) + ({}^9C_5 \times {}^4C_2) + ({}^9C_4 \times {}^4C_3)$

$= 36 + 336 + 756 + 504$

$= 1632$ ways.

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5.

100 participants

3 prizes

grand prize

second prize

third prize

$^{100}C_3 = 161700$

$^{99}C_2 = 4851$

$P(\text{Jamilah wins}) = \frac{4851}{161700}$

$= 0.03$

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6.

1 bag

white ball	black ball
(4)	(3)

1 bag

white ball	black ball
(3)	(5)

randomly pick

probability pick ball is black from second bag.

Bag 1

white = 4

black = 3

total = 4 + 3

= 7

Bag 2

white = 3

black = 5

total = 3 + 5

= 8

probability (B_1)

$= \frac{1}{2}$ (0.5)

probability (B_2)

$= \frac{1}{2}$ (0.5)

total probability

Let D = event of picking black ball

$P(B_2 \cap D)$ = picking ball from bag 2

$P(B_2 \cap D) = P(B_2) \cdot P(D \mid B_2)$

$P(B_2) = \frac{1}{2}$ $P(D \mid B_2) = \frac{5}{8}$

$P(B_2) \cdot P(D \mid B_2) = \frac{1}{2} \cdot \frac{5}{8}$

$= \frac{5}{16}$

$= 0.3125$.

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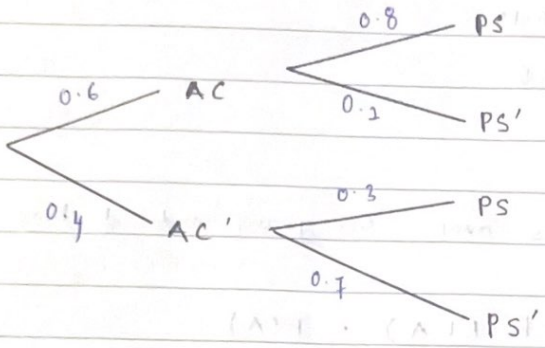
7. AC = advanced calculus

PS = pre-health science.



$P(PS) = (0.6 \times 0.8) + (0.4 \times 0.3)$

$= 0.48 + 0.12$

$= 0.6$

$P(PS \mid AC) = 0.8$

$P(PS \mid AC') = 0.3$

$$P(AC \mid PS) = \frac{P(PS \mid AC)}{P(PS)}$$

$$= \frac{(0.8)(0.6)}{0.6}$$

$$= \frac{0.48}{0.6}$$

$P(AC \mid PS) = 0.80$

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8. $P(A) = 0.15$ $P(B|A) = 0.28$

$P(A') = 1 - P(A)$ $P(B|A') = 0.57$

$= 1 - 0.15$

$= 0.85$

(a) the person is over 60 years old & has a loan

$P(A \cap B) = P(B|A) \cdot P(A)$

$= 0.28 \cdot 0.15$

$= 0.042$

(b) the person has no loan

$P(B') = 1 - P(B)$

$P(B) = [P(B|A) \cdot P(A)] + [P(B|A') \cdot P(A')]$

$= (0.28 \cdot 0.15) + (0.56 \cdot 0.85)$

$= 0.042 + 0.476$

$= 0.518$

$P(B') = 1 - 0.518$

$= 0.482$

(c) the person has loan, the person less than or equal to 60 years

$P(B|A') = 0.56$

(d) the person is over 60 | person has loan.

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

$= \frac{0.042}{0.518}$

$= 0.0811$

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9. i. set of vertices, set of edges, table edge - endpoint.

$V = \{ v_1, v_2, v_3, v_4, v_5, v_6 \}$

$e = \{ e_1, e_2, e_3, e_4, e_5, e_6, e_7, e_8, e_9, e_{10} \}$

edge	end point
e_1	$\{ v_1, v_2 \}$
e_2	$\{ v_2, v_3 \}$
e_3	$\{ v_3, v_4 \}$
e_4	$\{ v_4, v_5 \}$
e_5	$\{ v_4 \}$
e_6	$\{ v_4, v_5 \}$
e_7	$\{ v_5, v_2 \}$
e_8	$\{ v_1, v_5 \}$
e_9	$\{ v_1, v_5 \}$
e_{10}	$\{ v_1, v_6 \}$

ii- incidence matrix.

$I_G =$

	e_1	e_2	e_3	e_4	e_5	e_6	e_7	e_8	e_9	e_{10}
v_1	1	0	0	0	0	0	0	1	1	1
v_2	1	1	0	0	0	0	1	0	0	0
v_3	0	1	1	0	0	0	0	0	0	0
v_4	0	0	1	1	1	1	0	0	0	0
v_5	0	0	0	0	0	1	1	1	1	0
v_6	0	0	0	0	0	0	0	0	0	1

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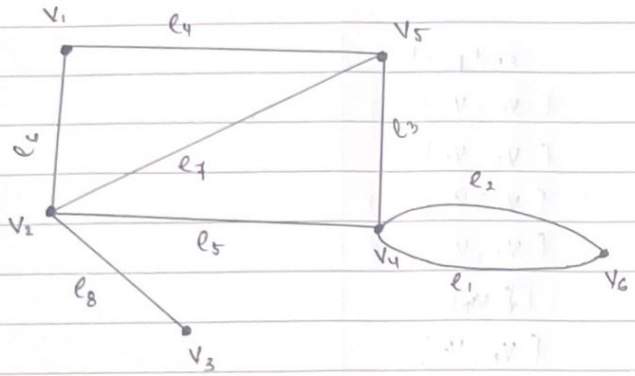
10. $V_1 = e_4, e_6$ $V_4 = e_1, e_2, e_3, e_5$

$V_2 = e_5, e_6, e_7, e_8$ $V_5 = e_3, e_4, e_7$

$V_3 = e_8$ $V_6 = e_1, e_2$



11.

$A_{G2} =$

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

$A_{G3} =$

	1	2	3	4
1	0	0	1	0
2	1	0	0	0
3	0	1	0	0
4	0	1	1	0

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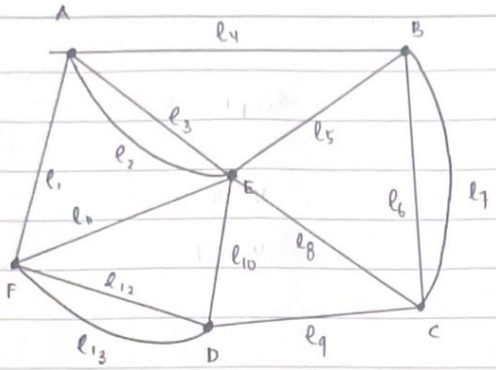
12.

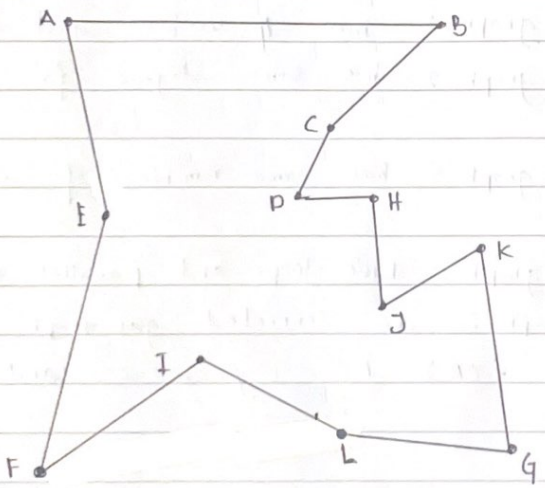


vertex	A	B	C	D	E	F
degree	4	4	4	4	6	4

This is euler circuits because all vertices has even degree. Hence the graph has euler graph :-

A, ℓ_4, B, ℓ_7, C, ℓ_6, B, ℓ_5, E, ℓ_8, C, ℓ_9, D, ℓ_{10}, E, ℓ_{11} F, ℓ_{12}, D, ℓ_{13}, F, ℓ_1, A, ℓ_2, E, ℓ_3, A

13.



- The graph has hamiltonian cycle.
- C - B - A - E - F - I - L - G - K - J - H - D - C.

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14.

Graph 1	Graph 2
V = 4	V = 4
w = 7	w = 7
deg(A) = 4	deg(A') = 4
deg(B) = 3	deg(B') = 3
deg(c) = 4	deg(c') = 4
deg(d) = 1	deg(d') = 1

$f(A) = A'$
$f(B) = B'$
$f(c) = C'$
$f(D) = D'$

- Both Graph 1 and graph 2 has 4 vertices and 7 edges
- Both Graph 1 and graph 2 has same degree for corresponding vertices
- Both Graph 1 and graph 2 has same numbers of connected of components
- Both Graph 1 and graph 2 have loops and parallel edges
- Both Graph 1 and graph 2 are connected ~~gat~~ graph
- $f(A) = A'$, $f(B) = B'$, $f(c) = c'$ and $f(D) = D'$