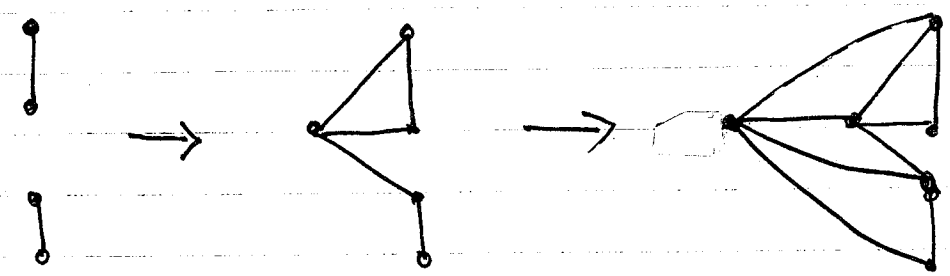
Solutions Assignment 1

Q1 i) S_1: 4, 4, 3, 3, 2, 2

↘ 3, 2, 2, 1, 2

↘ 3, 2, 2, 2, 1

1 1 1 1

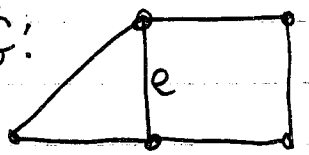


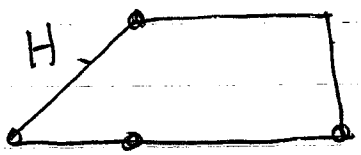
ii) S_2 : 8, 6, 6, 5, 4, 3, 2, 1, 1

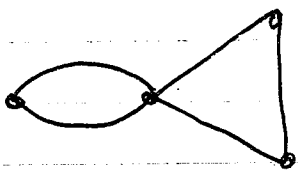
↘ 5, 5, 4, 3, 2, 1, 0, 0

↘ 4, 3, 2, 1, 0, 0, 0

However this last sequence is not graphical as we need a simple graph on 4 vertices with one vertex of degree 4. This is not possible

Q2. G: 

$H = G \setminus e$ 

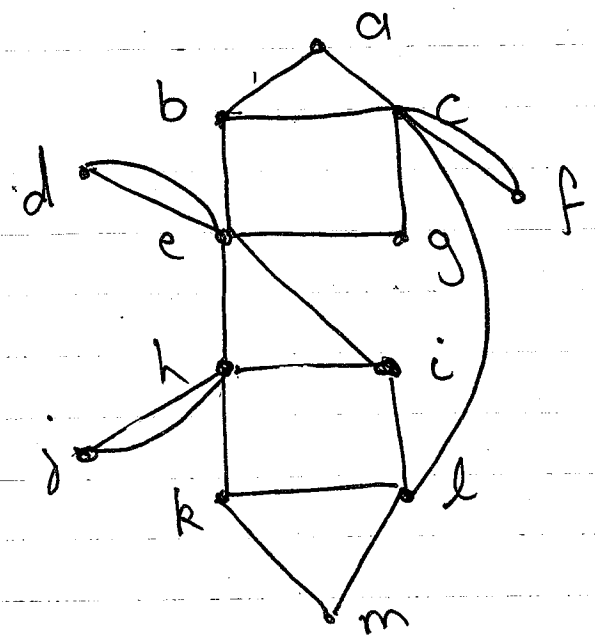
$H' = G \cdot e$ 

$\tau(G) = \tau(G \setminus e) + \tau(G \cdot e)$

$= 5 + 2.3 = 11.$

Soln Ass 1 Continued

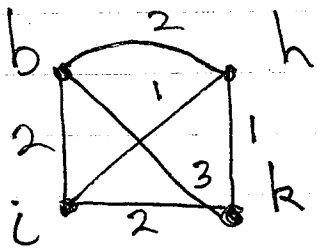
Q3 STEP 1: Double any bridges.



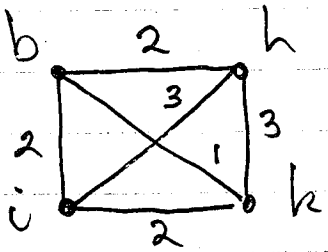
STEP 2: Identify all vertices of odd degree.

b: deg(b) = 3
h: deg(h) = 5
i: deg(i) = 3
k: deg(k) = 3

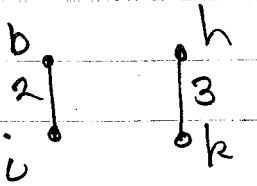
STEP 3 Construct a weighted K_5 on odd vertices. (edge weights correspond to length of shortest path between corresponding vertices.).



STEP 4 translate weights. to (max weight + 1) − weight

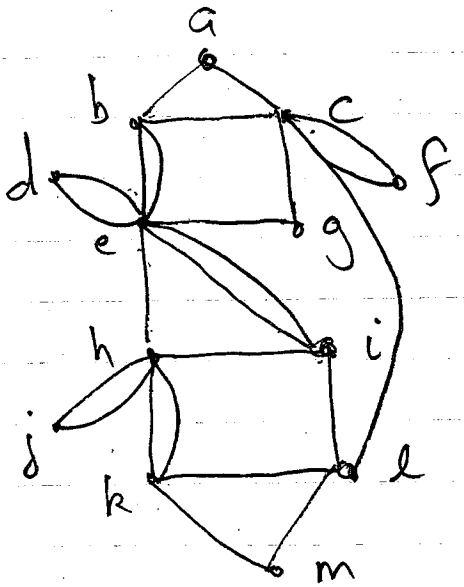


STEP 5 Identify matching giving maximum weighted edges



Sol^ Ass 1 Continued

STEP 6 Double edges on path b–i and h–k

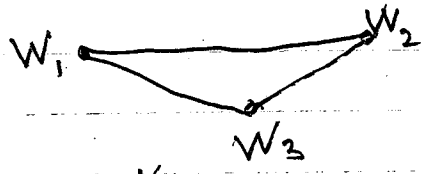


a b c f c g e i e b e d e
h j h k h i l k m l c a

Q4 i)



K_2

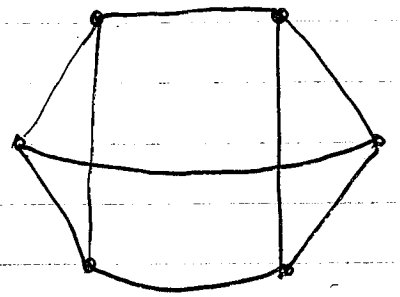


K_3

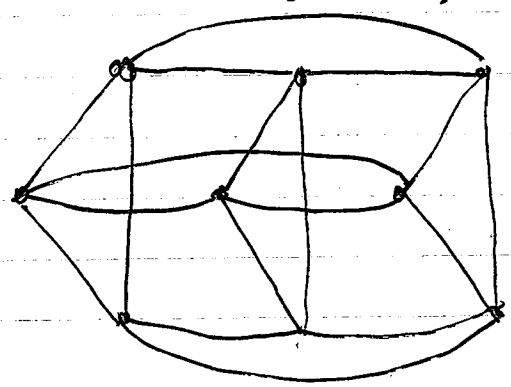
ii) $V(K_2 \times K_3) = \{(v_1, w_1), (v_1, w_2), (v_1, w_3), (v_2, w_1), (v_2, w_2), (v_2, w_3)\}$.

$E(K_2 \times K_3) = \{\{(v_1, w_1), (v_1, w_2)\}, \{(v_1, w_1), (v_1, w_3)\}, \{(v_1, w_2), (v_1, w_3)\}, \{(v_2, w_1), (v_2, w_2)\}, \{(v_2, w_1), (v_2, w_3)\}, \{(v_2, w_2), (v_2, w_3)\}, \{(v_1, w_1), (v_2, w_1)\}, \{(v_1, w_2), (v_2, w_2)\}, \{(v_1, w_3), (v_2, w_3)\}\}$.

iii) $K_2 \times K_3$



$K_3 \times K_3$.



iv) $K_2 \times K_3$ $K_3 \times K_3$

