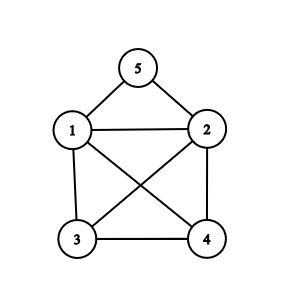
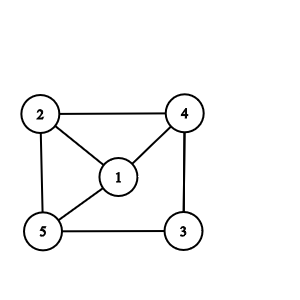
**Question 1**

**a)**

(i) 3,3,3,3,2

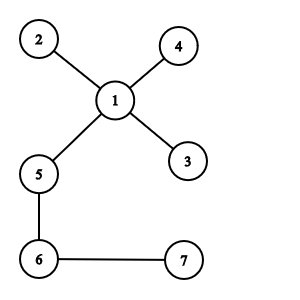
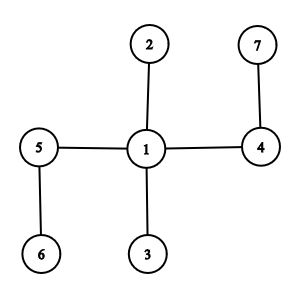
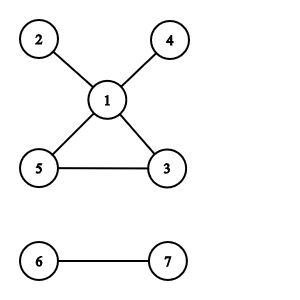


(ii) 3,3,3,2,2



**b)**

1,1,1,1,2,2,4



**c)**

**Number of Edges**

Therefore, the number of edges of the compliment of is 24

**Question 2**

a)

Let f be a bijective function from to

Let the correspondence between the graphs be

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 |
| a | b | c | d | e | f |

Therefore, the pair of graphs and are isomorphic

b)

Let f be a bijective function from to

Let the correspondence between the graphs be

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 |
| a | d | b | c | f | e |

Therefore, the pair of graphs and are isomorphic

**Question 3**

1

2

3

4

5

6

**Euler's Formula for Planar Graphs**

By Euler’s formula, the graph has 7 faces which corresponds to the planar graph drawn above

Therefore, is planar.

**Question 4**

**Handshake Lemma**

The sum of degree of all vertices of a graph is twice the size of graph.

Assume that there exists a planar graph with all vertices having degree at least 6

Then:

If is planar, then we know that .

*The graph G would have at least 3 vertices*

Thus

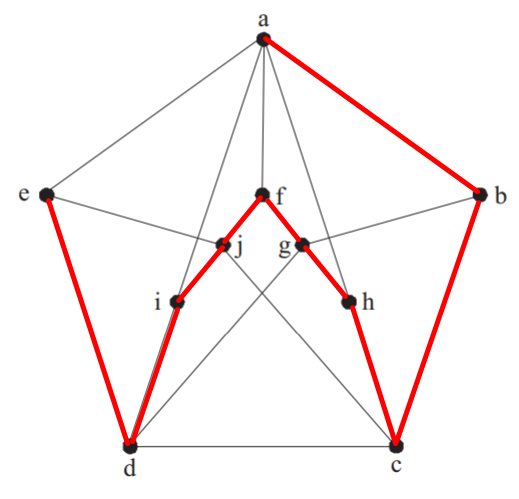
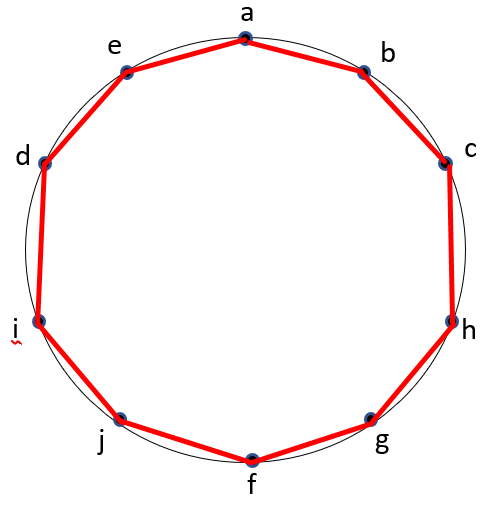
which is a contradiction,

Thus, every planar graph has a vertex of degree at most s

**Question 5**

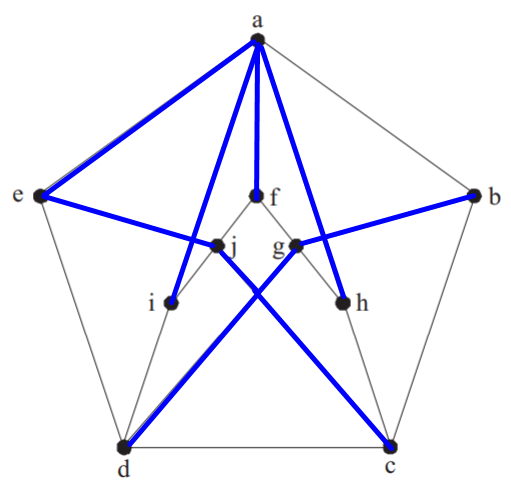
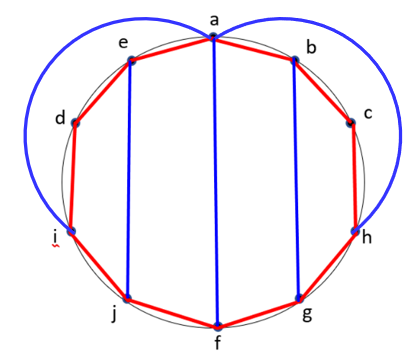
Step 1: Find a circuit that contains all the vertices of our graph

Hamiliton circuit: a-b-c-h-g-f-j-i-d-e



(draw it as a large circle)

Step 2: The remaining non-circuit edges, called chords, must be drawn either inside or outside the circle in a planar drawing.



Using inside-outside symmetry:

The edges af, ej and bj and ae are drawn inside

The edges ai and ah must therefore be drawn outside

The edges dg and cj are impossible to draw

Therefore, the graph is not planar

configuration