# Week 8 Assignment

**The due date for submitting this assignment has passed.**

**Due on 2021-03-17, 23:59 IST.**

**As per our records you have not submitted this assignment.**

Graphs: types, Euler's theorem, matching, Hall's Marriage Theorem, representing graphs, graph isomorphism, vertex and edge connectivity

1) Consider the statement below and choose the correct answer from the options: *1 point*

i. In an undirected graph there are always an even number of vertices with even degree
ii. In an undirected graph there are always an even number of vertices with odd degree
iii. In an undirected graph there are always an odd number of vertices of odd degree
iv. In an undirected graph there are always an odd number of vertices of even degree

- Statement i is correct
- Statement ii is correct
- Statement iii is correct
- Statement iv is correct

No, the answer is incorrect.
Score: 0

**Accepted Answers:**
*Statement ii is correct*

2) A cycle on n vertices is isomorphic to its complement. Choose the possible values of n. *1 point*

- 7k+1 where k is a natural number
- 5k + 2 where k is a natural number
- 5
- 8

No, the answer is incorrect.
Score: 0

**Accepted Answers:**
*5*

3) Which of the following is/are true? *1 point*

- A complete graph of n vertices has C(n,2) edges
- A wheel graph having n vertices has 2*(n-1) edges
- A cycle graph with n vertices has n edges
- A complete graph is also a regular graph

No, the answer is incorrect.
Score: 0

**Accepted Answers:**
*A complete graph of n vertices has C(n,2) edges*
*A wheel graph having n vertices has 2*(n-1) edges*
*A cycle graph with n vertices has n edges*
*A complete graph is also a regular graph*

4) Which of the following is/are true? *1 point*

- Two graphs are isomorphic as long as they have the same number of nodes and edges
- An undirected graph with degree sequence (4,4,3,3,2,2,1) can be formed
- The maximum number of edges in an undirected bipartite graph of 20 nodes is 200
- Isomorphic graphs preserve graph invariant properties

No, the answer is incorrect.
Score: 0

**Accepted Answers:**
*Isomorphic graphs preserve graph invariant properties*

5) Given a graph G=$K_6$, a complete graph of 6 vertices. If A=κ(G), the vertex connectivity of G, and B=λ(G), the edge connectivity of G, then the value of A*B is *1 point*

- 25
- 36
- 0
- 30

No, the answer is incorrect.
Score: 0

**Accepted Answers:**
*25*

6) Consider a simple graph G=(V,E). Which of the following are incorrect about the graph G? *1 point*

- G can have all vertices of even degree, with no two vertices having the same degree
- Given a matching M for the graph G, then M can contains a set of edges that form a cycle
- If G is a bipartite graph with bipartition ($V_1$,$V_2$), then there always exist a complete matching M from $V_1$ to $V_2$
- None of the given options

No, the answer is incorrect.
Score: 0

**Accepted Answers:**
*G can have all vertices of even degree, with no two vertices having the same degree*
*Given a matching M for the graph G, then M can contains a set of edges that form a cycle*
*If G is a bipartite graph with bipartition ($V_1$,$V_2$), then there always exist a complete matching M from $V_1$ to $V_2$*

7) Choose the correct statements from the following. *1 point*

- If G is a complete bipartite graph with bipartition ($V_1$,$V_2$), then there exist exactly two vertex cuts (separating sets) for G
- There exists a simple connected graph with vertex connectivity, κ(G)=0
- The sum of edge connectivity of each component in a disconnected graph G is equal to the edge connectivity of G
- None of the given statements

No, the answer is incorrect.
Score: 0

**Accepted Answers:**
*If G is a complete bipartite graph with bipartition ($V_1$,$V_2$), then there exist exactly two vertex cuts (separating sets) for G*

8) Which of the following statements is/are incorrect? *1 point*

- If G=(V,E) is a graph without self-loops and |V|≤3, then G contains at least two vertices of same degree
- The edge connectivity for every Wheel $W_n$ is 3
- Every two graphs with the same degree sequence are isomorphic
- None of the given options

No, the answer is incorrect.
Score: 0

**Accepted Answers:**
*If G=(V,E) is a graph without self-loops and |V|≤3, then G contains at least two vertices of same degree*
*Every two graphs with the same degree sequence are isomorphic*

9) Which of the following is/are true? *1 point*

- A tree has no bridges
- A bridge cannot be part of a simple cycle
- Every edge of a tree is a bridge
- A graph with bridges cannot have a cycle

No, the answer is incorrect.
Score: 0

**Accepted Answers:**
*A bridge cannot be part of a simple cycle*
*Every edge of a tree is a bridge*

10) The maximum number of possible edges in an undirected graph with n vertices and k connected components is *1 point*

- $k\left\lfloor\frac{n}{2k}\left(\frac{n}{k}-1\right)\right\rfloor$
- $\frac{n(n-1)}{2}-k$
- $\frac{(n-k)(n-k+1)}{2}$
- $\frac{n(n-1)}{2}-nk$

No, the answer is incorrect.
Score: 0

**Accepted Answers:**
$\frac{(n-k)(n-k+1)}{2}$