

1. What is a characteristic of a proper graph coloring?

- a) Adjacent vertices can have the same color.
 - b) Each vertex is assigned a unique color.
 - c) No two adjacent vertices have the same color.
 - d) The number of colors used is always 2.
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2. What is the chromatic number of a complete graph with n vertices?

- a) 1
 - b) n
 - c) $n - 1$
 - d) 2
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3. What is the chromatic number of a bipartite graph?

- a) 1
 - b) 2
 - c) 3
 - d) n
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4. What does a chromatic polynomial determine?

- a) The number of different ways to color a graph
 - b) The total number of edges in a graph
 - c) The degree of a graph
 - d) The shortest path in a graph
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5. What is an independent set in a graph?

- a) A set of adjacent vertices
 - b) A set of vertices with no edges between them
 - c) A set of vertices that form a cycle
 - d) A set of vertices connected to all other vertices
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6. What is a maximal independent set?

- a) An independent set that cannot be extended by adding another vertex
 - b) The largest independent set in a graph
 - c) A set of adjacent vertices
 - d) A set of vertices forming a path
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7. The independence number $\beta(G)$ of a graph is the size of which set?

- a) A spanning tree
 - b) The largest independent set
 - c) The smallest independent set
 - d) The set of all adjacent vertices
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8. What is a dominating set in a graph?

- a) A set of vertices where every vertex in the graph is adjacent to at least one of them
 - b) A set of vertices forming a cycle
 - c) A set of vertices with no edges
 - d) A set of isolated vertices
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9. What is a minimal dominating set?

- a) A dominating set that cannot be reduced while still being dominating
 - b) A set of adjacent vertices
 - c) A set that covers all edges in the graph
 - d) A set with no edges
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10. What is an edge covering in a graph?

- a) A set of edges such that every vertex is incident on at least one of them
 - b) A set of edges forming a cycle
 - c) A set of edges forming a spanning tree
 - d) A set of disconnected edges
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11. What is a spanning tree of a graph?

- a) A connected subgraph with all the vertices and no cycles
 - b) A disconnected graph
 - c) A subgraph containing all cycles
 - d) A tree with exactly one vertex
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12. What does the chromatic number of a graph represent?

- a) The number of colors required to properly color the graph
 - b) The number of cycles in the graph
 - c) The number of edges in the graph
 - d) The degree of the largest vertex
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13. In a bipartite graph, the chromatic number is always:

- a) 1
 - b) 2**
 - c) 3
 - d) n
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14. What is the significance of a minimal covering?

- a) It covers all vertices using the smallest number of edges**
 - b) It uses all edges in the graph
 - c) It contains cycles
 - d) It does not connect all vertices
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15. The chromatic number of an odd cycle graph is:

- a) 1
 - b) 2
 - c) 3**
 - d) n
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16. Which of the following describes a maximal independent set?

- a) It cannot be extended by adding another vertex while maintaining independence**
 - b) It must contain all vertices in the graph
 - c) It consists of adjacent vertices
 - d) It forms a cycle
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17. What is the relationship between the chromatic number and the independence number?

- a) The chromatic number is at least as large as the independence number
 - b) The chromatic number is always smaller than the independence number
 - c) They are always equal
 - d) They are unrelated
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18. In a graph, an edge covering is:

- a) A set of edges that ensures every vertex is incident to at least one of them
 - b) A set of disconnected edges
 - c) A set of edges forming a cycle
 - d) A set of independent edges
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19. The chromatic number of a tree with n vertices is always:

- a) 1
 - b) 2
 - c) 3
 - d) n
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20. The independence number of a graph is the size of:

- a) The largest independent set
- b) The smallest independent set
- c) The number of edges in the graph
- d) The number of cycles in the graph