**ROBERTS RAPHAEL**

Example:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| W | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 |  |  |  | 1 |  | 1 |  | 1 |
| 2 |  |  | 1 |  | 1 |  | 1 |  |
| 3 |  | 1 |  |  |  | 1 |  | 1 |
| 4 | 1 |  |  |  | 1 |  | 1 |  |
| 5 |  | 1 |  | 1 |  |  |  | 1 |
| 6 | 1 |  | 1 |  |  |  | 1 |  |
| 7 |  | 1 |  | 1 |  | 1 |  |  |
| 8 | 1 |  | 1 |  | 1 |  |  |  |

1. Color this graph using the GREEDY coloring algorithm. Use colors (as many as it takes)   
   **R**, **B**, **G**, **Y**, **S**, **M**, **A**, **T**, and **C**, in that order.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| greedy coloring | **R** | **R** | **B** | **B** | **G** | **G** | **Y** | **Y** |

1. Try to color this graph using the backtracking algorithm with *m* = 3 colors: **R**, **B**,and **G**,in that order. If there is no 3-coloring, just state so.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| backtracking, m = 3 | | **R** | **R** | **B** | **G** | **B** | **G** | **B** | **G** |

1. Try to color this graph using the fast two-coloring algorithm, using colors **R** and **B**.

If there is no 2-coloring, just state so.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| fast two-coloring | | **R** | **B** | **R** | **B** | **R** | **B** | **R** | **B** |

1. (5 pts)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| W | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1 |  | 1 |  |  |  |  | 1 | 1 |  |
| 2 | 1 |  |  |  |  | 1 |  |  | 1 |
| 3 |  |  |  |  |  |  | 1 |  |  |
| 4 |  |  |  |  | 1 |  |  | 1 |  |
| 5 |  |  |  | 1 |  |  | 1 |  |  |
| 6 |  | 1 |  |  |  |  |  |  |  |
| 7 | 1 |  | 1 |  | 1 |  |  |  |  |
| 8 | 1 |  |  | 1 |  |  |  |  |  |
| 9 |  | 1 |  |  |  |  |  |  |  |

1. Color this graph using the GREEDY coloring algorithm. Use colors (as many as it takes):   
   **R**, **B**, **G**, **Y**, **S**, **M**, **A**, **T**, **C**, in that order.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| greedy coloring | | **R** | **B** | **R** | **R** | **B** | **R** | **G** | **B** | **R** |

1. Try to color this graph using the fast two-coloring algorithm, using colors **R** and **B**.

If there is no 2-coloring, just state so.

No two color

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| fast 2-coloring | | **R** | **B** | **R** | **R** | **R** | **R** | **B** | **B** | **R** |

1. (10 pts)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| W | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1 |  |  |  | 1 |  |  |  |  |  |
| 2 |  |  | 1 |  |  | 1 |  |  |  |
| 3 |  | 1 |  |  | 1 |  |  | 1 |  |
| 4 | 1 |  |  |  |  | 1 | 1 |  | 1 |
| 5 |  |  | 1 |  |  | 1 | 1 | 1 |  |
| 6 |  | 1 |  | 1 | 1 |  | 1 | 1 | 1 |
| 7 |  |  |  | 1 | 1 | 1 |  | 1 |  |
| 8 |  |  | 1 |  | 1 | 1 | 1 |  | 1 |
| 9 |  |  |  | 1 |  | 1 |  | 1 |  |

1. Color this graph using the GREEDY coloring algorithm. Use colors (as many as it takes):   
   **R**, **B**, **G**, **Y**, **S**, **M**, **A**, **T**, **C**, in that order.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| greedy coloring | | **R** | **R** | **B** | **B** | **R** | **G** | **Y** | **S** | **R** |

1. Try to color this graph using the backtracking algorithm with *m* = 4 colors: **R**, **B**, **G**, and **Y**,in that order. If there is no 4-coloring, just state so.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| backtracking m = 4 | | **R** | **R** | **G** | **B** | **R** | **G** | **Y** | **B** | **R** |

1. Try to color this graph using the backtracking algorithm with *m* = 3 colors: **R**, **B**,and **G**,in that order.

If there is no 3-coloring, just state so.

No three color

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| backtracking m = 3 | | **R** | **R** | **B** | **G** | **G** | **R** | **B** |  |  |

1. Try to color this graph using the fast two-coloring algorithm, using colors **R** and **B**.

If there is no 2-coloring, just state so.

No two coloring

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| fast 2-coloring | | **R** | **B** |  | **B** | **B** | **R** | **R** | **B** | **R** |

1. (10 pts)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| W | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 1 |  |  |  |  |  |  |  | 1 |  | 1 |  | 1 |
| 2 |  |  | 1 |  |  |  | 1 | 1 |  | 1 |  |  |
| 3 |  | 1 |  |  | 1 |  |  |  |  |  |  |  |
| 4 |  |  |  |  | 1 |  |  |  | 1 |  | 1 |  |
| 5 |  |  | 1 | 1 |  |  |  |  |  |  |  | 1 |
| 6 |  |  |  |  |  |  | 1 | 1 |  |  |  |  |
| 7 |  | 1 |  |  |  | 1 |  |  |  |  |  |  |
| 8 | 1 | 1 |  |  |  | 1 |  |  |  |  | 1 |  |
| 9 |  |  |  | 1 |  |  |  |  |  | 1 |  | 1 |
| 10 | 1 | 1 |  |  |  |  |  |  | 1 |  | 1 |  |
| 11 |  |  |  | 1 |  |  |  | 1 |  | 1 |  | 1 |
| 12 | 1 |  |  |  | 1 |  |  |  | 1 |  | 1 |  |

1. Color this graph using the GREEDY coloring algorithm. Use colors (as many as it takes):   
   **R**, **B**, **G**, **Y**, **S**, **M**, **A**, **T**, **C**, **E**, **F**, **P**, in that order.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| greedy coloring | | **R** | **R** | **B** | **R** | **G** | **R** | **B** | **B** | **B** | **G** | **Y** | **S** |

1. Try to color this graph using the backtracking algorithm with *m* = 4 colors: **R**, **B**, **G**,and **Y**, in that order. If there is no 4-coloring, just state so.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| backtracking m = 4 | | **R** | **R** | **B** | **R** | **G** | **R** | **B** | **B** | **B** | **Y** | **G** | **Y** |

1. Try to color this graph using the fast two-coloring algorithm, using colors **R** and **B**.

If there is no 2-coloring, just state so.

No two coloring exists

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| fast 2-coloring | |  |  |  |  |  |  |  |  |  |  |  |  |