

CSC112      Fundamentals of Computer Science      Spring 2016  
Algorithm (pseudocode) for Lab 7 – Graph Coloring

For purposes of this problem, we assume that only one solution is sought.

```
// Class variables:
//     n -- the number of vertices in the graph
//     G -- the adjacency matrix for the graph
//     the_colors -- array of assigned colors,
//                 one entry for each vertex.
//                 Initially set to NO_COLOR
//     k -- the number of available colors
// Input:
//     m -- the number of decisions made up the this point

// Output:  A solution to the graph coloring problem

// Method:

bool graph_color( m )
{
    if ( m == n ) then { // All nodes have been assigned a color.
        output the solution represented by the array the_colors ;
        return true ; // Success
    }
    else {
        // Try to find a color for vertex m
        loop over all possible colors,  $c \in \{0, 1, 2, \dots, k - 1\}$  {
            if ( no vertex adjacent to vertex m has color c ) {
                assign color c to vertex m in array the_colors[] ;
                // Recursively explore the consequences of our choice.
                r = graph_color( m + 1 ) ;
                if (r) return true ; // We found a solution
                assign color NO_COLOR to vertex m ;
            } // end if
        } // continue loop
        // At this point, all colors have been tried at this recursive
        // level, and none have resulted in a solution.
        // Return "failure" from this recursive level.
        return false ; // I.e., "failure"
    }
}
```