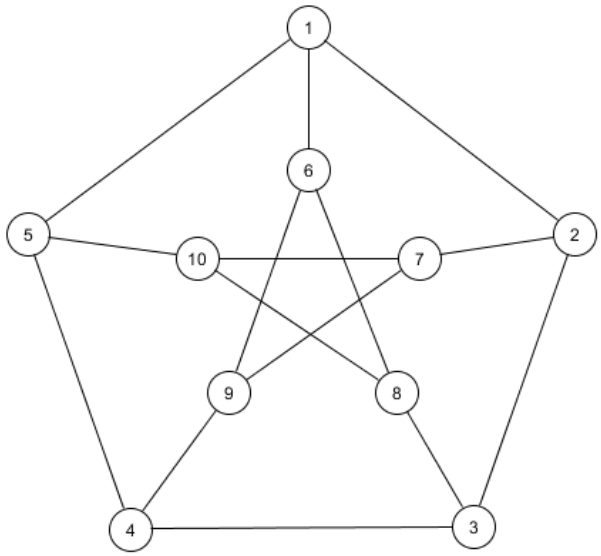
CS 594/690, Graph Algorithms, Applications and Implementations
Spring 2017, Homework 4

1. Use a greedy/list coloring with vertex order {1,3,8,6,2,5,4,9,10,7} to color the graph below. Label the vertices with the appropriate color/color number or simply list the vertices and their corresponding colors.



2. True or false. If the statement is false, provide a specific counterexample using a graph of order at most 5.
   a. Any greedy/list coloring of any bipartite graph will always produce an optimal 2-coloring.
   b. Any greedy/list coloring of any tripartite graph will always produce an optimal 3-coloring.

3. Write a program implementing greedy/list coloring. Your program should calculate three different colorings for each input graph using the following vertex ordering schemes:
   a. High to low degree
   b. Low to high degree
   c. Random vertex ordering

   Your program should output the number of colors used and the wall-clock run time for each of the schemes. Your output should look very similar to the following.

```
>./color graph4.txt
High to low: 2 colors, .006 sec
Low to high: 3 colors, .005 sec
Random: 3 colors, .006 sec
>
```

   Note that different pseudo-random number generators and/or different seeds can produce different results

The following apply as usual.

- You may choose any programming language you wish, as long as your program compiles and runs when invoked from the Linux command line on the EECS Linux machines, using only software currently installed. I will test your code on one of the Hydra Lab machines.
- Do not use any library routines specifically designed for graphs (e.g. Boost).
- Include an example how to compile and/or invoke your program in a README.txt file.

Submit your program by emailing all files necessary to compile and run your code to cphill25@utk.edu prior to the beginning of class next Wednesday, February 8. Bring a hard copy of your answers to questions 1 and 2 to class. If you have any questions, please do not hesitate to email me or drop by during office hours.