

Due: Wednesday, November 11, 2:30 PM EST

This assignment is worth 12.5% of the final grade. Each question is worth a multiple of 5 points. If you have no idea how to answer a question, you will receive 20% of the credit for that question by saying “I do not know how to answer this question”. Leaving the question blank, you will receive 10% of the credit. If your answer makes no sense, you will not receive any credit. Any answer that shows some understanding of the question will receive more 20% credit.

1. (5 points) Have you ever been notified of a possible computer vulnerability? Did you believe the warning, or did you treat it as a possible scam? If you believed that the warning was not a scam, what if anything did you do? Briefly explain. If you do not recall ever being notified of a possible computer vulnerability, are you at all concerned about the information stored on your computer? Explain briefly?
2. For this question we need to recall the following definitions regarding an undirected graphs. Let $G = (V, E)$. be a graph. :
 - A cycle is a sequence of vertices $u_1, u_2, u_3 \dots, u_k$ such that $(u_i, u_{i+1}) \in E$ for $1 \leq i \leq k - 1$ with $k \geq 3$ and $u_k = u_1$.
 - A tree is a connected graph without any cycles.
 - A bipartite graph $G = (V, E)$ is one where $V = V_1 \cup V_2$, $V_1 \cap V_2 = \emptyset$ and $E \subseteq V_1 \times V_2$. That is the set of vertices is partitioned into two subsets and all edges are between V_1 and V_2 .
 - A cycle is a sequence of vertices $v_1, \dots, v_k$ such that $(v_i, v_{i+1}) \in E$, $k \geq 3$ and $v_k = v_1$.
 - A simple graph is a graph with no self-loops and no parallel edges.
 - A simple graph $G = (V, E)$ has a k -colouring if there exists a function $\chi : V \rightarrow \{1, 2, \dots, k\}$ such that $\chi(u) \neq \chi(v)$ for all $(u, v) \in E$.

Answer the following questions concerning graphs,

- (5 points) Consider a graph which is a cycle. Characterize which cycles have a 2-colouring.
- (5 points) Show that every tree has a 2 colouring
- (5 points) Show that every tree is a bipartite graph.
- (5 points) Show that every bipartite graph has a 2 coloring.
- (5 points) Give an example of a bipartite graph which is not a tree.

3. (10 points)

Consider the Backstrom and Kleinberg table on slide 14 for class 11. What is your best explanation for the difference between men and women for the accuracy in predicting the romantic relationship in the Facebook subgraph? You can look at the paper if you want but it isn't necessary. Give your opinion in one or two paragraphs. Any reasonable and well stated argument will earn full credit.