University of Nevada, Las Vegas Computer Science 477/677 Spring 2024 Assignment 7: Due Saturday May 3 2025 11:59 PM

Upload your homework to Canvas.

Name:_

You are permitted to work in groups, get help from others, read books, and use the internet. Your answers must be written in a pdf file and uploaded to canvas, by midnight February 16th. Your file must not be unnecessarily long. If you have any questions, or you are having trouble uploading the assignment you may email the grader, Sebrina Wallace, at wallace4@unlv.nevada.edu. You may also send me email to ask questions.

- 1. Print out the file Handouts/astar01hw.pdf, and walk through the A^* algorithm for the single pair problem indicated. The values of the heuristics are given in the figures. It is possible that there are more figures in that file than you need.
- 2. Given a procedure void george(int n), it is possible that its time and space complexity are not asymptotically equal.
 - (a) What is the aymptotic time complexity of your code, in terms of n?
 - (b) What is the aymptotic space complexity of your code, in terms of n?
 - N.B. There are many possible answers to this question.
- 3. The k-coloring problem for a given constant k is the problem of determining whether a given graph can be k-colored. That means assigning one of k colors to each vertex such that no two neighboring vertices have the same color.
 - (a) It is known that the 3-coloring problem is \mathcal{NP} -complete, and thus there is no \mathcal{P} -TIME algorithm for the 3-coloring problem unless $\mathcal{P} = \mathcal{NP}$.
 - (b) Show that there is a \mathcal{P} -TIME algorithm for the 2-coloring problem. Hint: The test for 2-colorability can be expressed in only one line of text. You don't have to write any code.