CSE 101 Exam 1

Winter 2015

Instructions: Do not open until the exam starts. The exam will run for 45 minutes. The problems are roughly sorted in increasing order of difficulty. Answer all questions completely. You are free to make use of any result in the textbook or proved in class. You may use up to 6 1-sided pages of notes, and may not use the textbook nor any electronic aids. Write your solutions in the space provided, the pages at the end of this handout, or on the scratch paper provided (be sure to label it with your name). If you have solutions written anywhere other than the provided space be sure to indicate where they are to be found.

Name:

ID Number:

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Question 1 (Connected Components, 30 points). Identify the labels of the vertices in the strongly connected components of the graph below.
Question 2 (Cycles Through a Vertex, 35 points). Find a linear time algorithm that given a directed graph $G$ and a vertex, $w$, determines whether or not $G$ contains a cycle through $w$, and show that your algorithm is correct.
Question 3 (Minimax Path, 35 points). Modify Dijkstra’s algorithm so that given a weighted graph \( G \) and two vertices, \( s \) and \( t \), it computes the minimum value \( x \) so that there exists an \( s - t \) path all of whose edges have weight at most \( x \). You do not need to justify your answer.