CS401 FS2004 Exam 2

This is an open-book, open-notes exam. The use of electronic devices is strictly forbidden. Mark all paper you use with your name and the string “cs401fs2004 exam2”. If you are caught cheating, you will receive a zero grade for this exam. The max number of points per question is indicated in square brackets after each question. The sum of the max points for all the questions is 140, but note that the max exam score is capped at 100 (note that answering three of the four questions completely correctly is more than enough for a perfect score of 100!). You have exactly 50 minutes to complete this exam. Good luck!

1. You are hired by the severely understaffed admissions office of a major university to design an automated screening process which receives electronic datafiles on applicants as input and gives admission advice as output. Typical types of advice are: reject, accept, investigate further, etc. You have access to all the experienced admissions office staff as well as many previous years of applicant files which contain applications as well as admission decisions. Outline in detail your EA design to tackle this problem. [35]

2. You are hired by the overworked chair of a Computer Science department to design an automated course scheduling program which receives as input the list of sections to be taught, the list of instructors, a can-teach relation between the instructors and the sections, a want-to-teach relation between the instructors and the sections, a list of time slots, a can-be-available relation between the instructors and the time slots, and a preferred-time slot relation between the instructors and the time slots. You do not have to worry about how you schedule sections relative to each other nor where they will be taught. Outline in detail your EA design to tackle this problem, enforcing all hard constraints while keeping the instructors as happy as possible. [35]

3. You have decided you would prefer to skip the decades of hard work between college and retirement by applying your vast knowledge of EC to making a kill on eBay. Your idea is to create an autonomous program which will exclusively buy and sell items on eBay to generate profit. Outline in detail your EA design of this program. [35]

4. You have seen the light and joined UMR’s ACM SIG Security. It is time to go Wardriving and you need to build a cantenna. Any can (e.g., can of vegetables) will do, but for best reception you need to optimize some complex set of equations describing the center point of the antenna. There are two parameters that you can easily influence by your selection of the can, namely can diameter and height; however, both diameter and height are constrained by two sets of inequalities based on can availability and certain physical properties of antennas. Outline in detail how you would use an EA to optimize the can diameter and height under these constraints so that you know which can to buy at your favorite grocery store. [35]