Name:

This quiz is closed book and only one notes sheet. There are 100 points in seven questions and you must show your work to receive full credit. Put your name, the date, and “Exam 3” on each sheet of paper you turn in. Papers must be stapled.

1. Define a Turing Co-recognizable language. (5 points)

2. Can a single language be both Recognizable and Co-recognizable? (5 points)

3. The Halting Problem
   (a) In a few words, what is the Halting Problem? (10 points)
   
   (b) What are the implications of the Halting Problem (and/or the Decidable Languages Problem) outside of computer programming? (10 points) (HINT: It is not “will my program ever end?”)
(c) Prove there is no TM to solve the Halting Problem (20 points)
4. Define the following classes (5 points each):
   
   (a) Class P

   (b) Class NP

   (c) Class NP-Complete

5. Give an example of a problem in each of the following classes (5 points each)
   
   (a) Class P

   (b) Class NP-Complete

6. What is “the problem in computer science?” (5 points)
7. Given that the Bin Packing Problem is NP-Complete, what would be the steps to show that the 0/1 Knapsack is NP-Complete? (20 points)