

Principles of Artificial Intelligence

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Problem set 3, Fall 2007

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Note: The problems marked with ** are targeted primarily to students enrolled in ComS 572. Others are of course encouraged to solve such problems for extra credit. Please feel free to consult with the instructor or the TA if you have questions.

1. (10 pts.) Solve problem 5.2 from the Russell and Norvig text.
2. (10 pts.) Solve problem 5.3 from the Russell and Norvig text.
3. (10 pts.) Solve problem 5.5 from the Russell and Norvig text.
4. (10 pts.) Solve problem 5.6 from the Russell and Norvig text.
5. (10 pts.) Solve problem 5.8 from the Russell and Norvig text.
6. ** (20 pts.) Solve problem 5.10 from the Russell and Norvig text.
7. (20 pts.) Solve problem 5.11 from the Russell and Norvig text.
8. ** (20 pts.) Solve problem 5.13 from the Russell and Norvig text.
9. (20 pts.)
 - (a) Draw line drawing of a physically realizable tri-hedral object and label it using Waltz's labeling algorithm. Show the intermediate steps in the labeling process.
 - (b) Draw a line drawing of a physically unrealizable object that Waltz's procedure will be able to identify as such.
10. (10 pts.) Do the following assertions contradict each other? If so, why? If not, why not?
 - (a) Scene interpretation is NP-hard.
 - (b) Waltz's line labeling algorithm terminates in $O(n^3)$ steps where n is the number of vertices.
11. (10 pts.) Solve problem 4.11 from the Russell and Norvig text.
12. (20 pts.) Devise a genetic algorithm to solve the N -city travelling salesperson problem. Specifically, design two alternative representations (mapping of candidate TSP solutions to individuals in a population), the corresponding genetic operators, and fitness functions.