CS480 Introduction to Artificial Intelligence (Fall, 2018)

## Assignment 3

Due: Thursday, Nov. 1, 2018

Total Points: 100

1. Crossword Designer

You are asked to design a program to design crossword. The following is a simple crossword. Given the list of words:

AFT LASER

ALE LEE

EEL LINE

HEEL SAILS

HIKE SHEET

HOSES STEER

KEEL TIE

KNOT

+---+---+---+---+---+

| 1 | | 2 | | 3 |

+---+---+---+---+---+

| # | # | | # | |

+---+---+---+---+---+

| # | 4 | | 5 | |

+---+---+---+---+---+

| 6 | # | 7 | | |

+---+---+---+---+---+

| 8 | | | | |

+---+---+---+---+---+

| | # | # | | # |

+---+---+---+---+---+

The numbers 1,2,3,4,5,6,7,8 in the puzzle correspond to the words that will start at those locations.

The variables can be represented in the following table with the specific domain.

VARIABLE | STARTING CELL | DOMAIN

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1ACROSS | 1 | {HOSES, LASER, SAILS, SHEET, STEER}

4ACROSS | 4 | {HEEL, HIKE, KEEL, KNOT, LINE}

7ACROSS | 7 | {AFT, ALE, EEL, LEE, TIE}

8ACROSS | 8 | {HOSES, LASER, SAILS, SHEET, STEER}

2DOWN | 2 | {HOSES, LASER, SAILS, SHEET, STEER}

3DOWN | 3 | {HOSES, LASER, SAILS, SHEET, STEER}

5DOWN | 5 | {HEEL, HIKE, KEEL, KNOT, LINE}

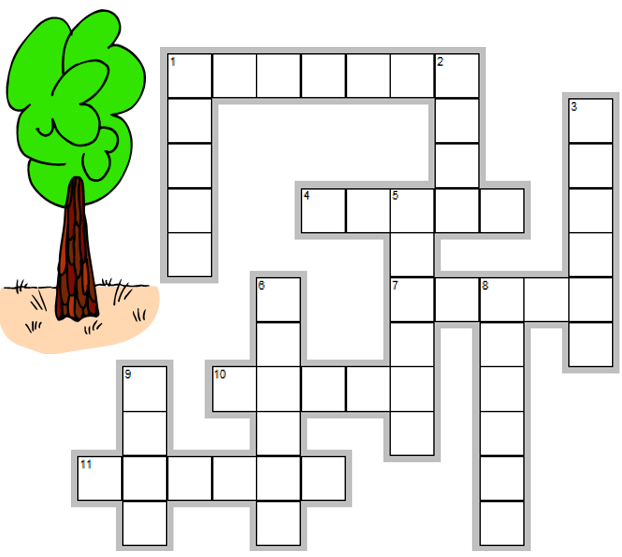
6DOWN | 6 | {AFT, ALE, EEL, LEE, TIE}

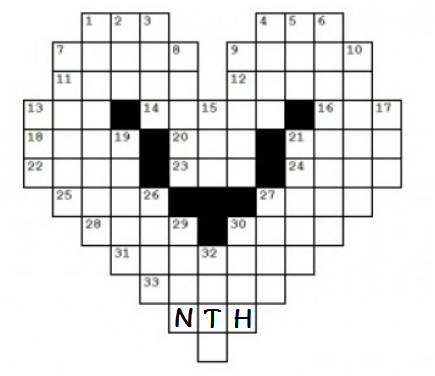
Task 1. Backtracking (30 pts)

Specify the constraints among variables. Implement a simple backtracking algorithm to come up with a solution for the above puzzle.

Task 2. Larger puzzle. (20 pts)

Now, let’s consider a bigger puzzle with more words. [Words.txt](file:///C:\Dropbox\CS480\Assg\Words.txt) file contains ~21,000 pocket English diction words. Now you are asked to design the following puzzle. Notice that this crossword puzzle is much bigger and harder than the one in task one. Specify constraints among variables. You need to design a smarter backtracking algorithm.





What to Hand in

1. Well documented codes implementing the crossword designer program. The crossword designer program should print out the output of the two puzzles as well as the timing. A README file should provide instructions on how to compile and execute the code.
2. Solutions you obtained for the crossword designer program.

Please turn in your solutions in class and send the programs to [yalan001@odu.edu](mailto:yalan001@odu.edu) before the assignment due date.