CSE 4082 – Assignment 1

(Due 15.12.2024 at 23:59, electronic submission only, to cse.cse482@gmail.com)

1. Read the paper [1] on the Knight's Tour Problem (KTP).

2. Describe the problem formally and classify its environment.

3. Implement a Java/C/C++ program for finding a knight's tour on a *n*-by-*n* chess board using:
   a. Breadth First Search
   b. Depth First Search
   c. Depth First Search with Node Selection Heuristic h1b in [1]
   d. Depth First Search with Node Selection Heuristic h2 in [1]

   Your program should input the size of the board (n), a search method (a-d) and a time limit (t), and print the following information:

   i. The search method and the time limit.
   ii. A message indicating the return status: "A solution found.", "No solution exists.", "Timeout.", "Out of Memory".
   iii. The solution itself if a solution has been found.
   iv. The time spent for finding the solution if a solution has been found.
   v. The number of nodes expanded (even if no solution is found or timeout occurred).

4. For each search method a-d, and for each board size n = 8, 16, 32, 41, and 52 report the output of your program with a time limit of 15 minutes.

5. For the search method d, determine the maximum board size that your program can find a solution within 15 minutes. Give the corresponding output.

   Implementation Notes:

   a. The coordinate of the lower left square of the board should be a1, and the coordinate upper right square should be h8 where the digit part of the coordinate represents the row of the square.
   b. Your source code should be cleverly commented.
   c. You should prepare a design document along with the problem information requested in (2.) above.
   d. Further details of the project will be discussed in the class.
   e. You should work in groups of 3.

References:

[1] Paris, Luis. "Heuristic Strategies for the Knight Tour Problem." *International Conference on Artificial Intelligence* (2004).