# Fundamentals of Computer Science
## Lab 12

In this week's lab, we will gain experience with recursion. The problem is use recursion to search for a path through a maze. The maze is defined by a 2-D character array with $m$ rows and $n$ columns, together with a start position and an desired ending position. At each moment in time, your recursive search will keep track of a current position $i, j$. The rules of the game:

1. On each step, the virtual "lab rat" in our maze can move one position up, down, left or right, with some restrictions.

2. The virtual rat may not move outside the boundaries of the maze.

3. The 2-D character array contains characters significant to our virtual rat.

   (a) An 'X' character blocks the path. Our virtual rat can not enter a square occupied by an 'X'. The rat may not alter a position in the maze containing an 'X'.

   (b) An '_' (underscore) character indicates a free spot into which the virtual rat may move.

   (c) Our rat may leave a trail of virtual "bread crumbs" to prevent getting stuck going around in circles. An '_' (underscore) character may be changed to a '.' character, indicating a "bread crumb".

   (d) When our rat backs out of an unsuccessful path the rat can "pick up the bread crumb". I.e., change the '.' character back to an '_' (underscore) character.

   (e) For purposes of tracing the progress of the rat, you can change positions containing '.' or '_' to '*', indicating the position of the rat. Make sure you change it back when you move the rat.

The maze may be downloaded from:

<div align="center">

`http://menehune.opt.wfu.edu/CSC112/maze.h`

</div>

Use the `#include` directive to include file `maze.h`

Positions in the maze $(i, j)$ represent row $i$ and column $j$. When you find a path, your program should output the path as a sequence of legal moves leading to the destination. For example:

```
(0,0) to (1,0)
(1,0) to (2,0)
(2,0) to (2,1)
    .
    .
    .
```

Create a directory named Lab12. Keep all of your source and compiled programs in the directory Lab12.

**Turn in:** Change to the directory containing the sub-directory "Lab12". Create a file named "lab12.tar" using the command:

```
tar cf lab12.tar Lab12
```

Upload the file "lab12.tar" to your account on telesto.