CS 202: Introduction to Computation
Fall 2010: Practice Exam #2

Name: _____

Question	Possible Points	Received Points
1	20	
2	20	
3	20	
4	20	
5	20	
Total	100	

This exam is closed notes.

You have 50 minutes to complete the 5 questions on this exam.

Please write your answers clearly.

Good luck!

Question 1: What are you doing with those lists?

Imagine you have eight different Scratch programs, each which manipulates a list "What Do I Do?" You job is to "execute" the scripts in your head to repeat the exact same steps and operations that Scratch would. For each of the following 8 scripts, **show the contents of the List "What Do I Do" at the end of the script**. Be careful of the tiny but important differences across scripts! Optional: You may find it helpful to show the contents of the List after every iteration of the repeat loops.


when clicked
delete all of What Do I Do?
set counter to 1
repeat 10
insert counter at 1 of What Do I Do?
change counter by 1
when clicked
delete all of What Do I Do?
repeat 10
add 1 to What Do I Do?
repeat 10
add 2 to What Do I Do?
when clicked
delete all of What Do I Do?
repeat 10
add 1 to What Do I Do?
delete all of What Do I Do?
repeat 10
add 2 to What Do I Do?
when clicked
delete all of What Do I Do?
set counter to 1
repeat 10
add 1 to What Do I Do?
repeat 5
replace item counter of What Do I Do? with 2
change counter by 1
when clicked
delete all of What Do I Do?
repeat length of What Do I Do?
replace item any of What Do I Do? with 2

Question 2. Is there too much going on at one time?

Consider the five sets of scripts (lettered A, B, C, D, and E) provided in the appendix. Each set of scripts is a single program and is started when the Green Flag is clicked. Each set of scripts has a single variable: test. For each of the five sets of scripts, answer the following two questions.

First, which scripts within a set will run **concurrently** with one another? Why? You should use the names "script 1" "script 2" and "script 3" to identify each script.

Second, what final values could the **test** variable contain after all of the scripts in the set terminate? What different orderings of the scripts could lead to the different values?

A)

B)

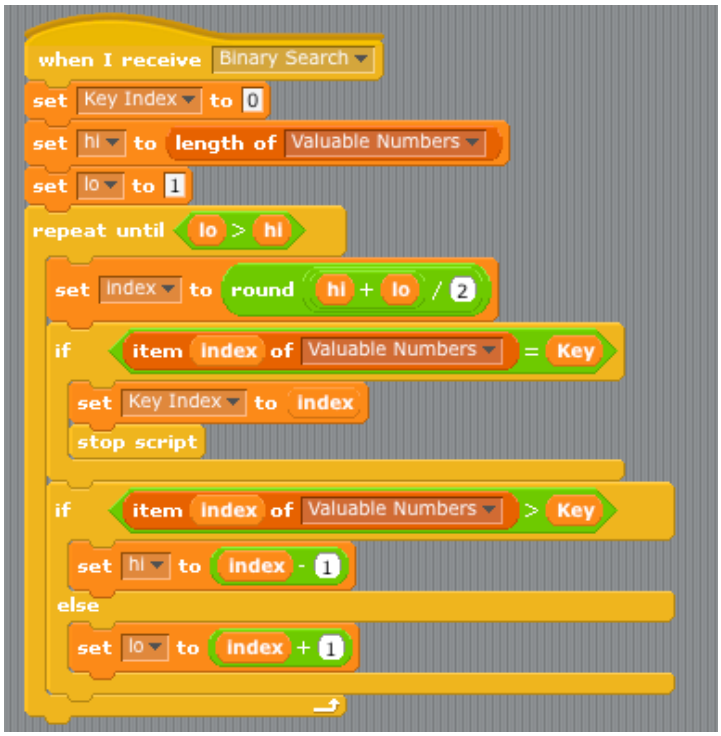
C)

D)

E)

3) Searching for the answer

The following script implements a binary search; it is the same code that was shown in class. It has access to five variables named **Key, Key Index, hi, lo,** and **index** and one list named **Valuable Numbers**. The function **round x** will round the number **x** to the nearest integer; numbers in the middle of two integers (such as 6.5) are rounded up to (7.0).



A) Briefly state the purpose of each of the five variables.

B) Imagine the List **Valuable Numbers** contains the following 16 elements:

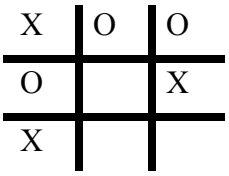
Index	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Contents	5	8	10	13	14	25	40	41	49	68	73	77	80	84	96	98

When searching for the Key 14, what are the following values at the end of each iteration of the **repeat until** loop?

Loop #	index	item (index) of Valuable Numbers	Is item (index) of Valuable Number >, <, or = to Key?	lo	hi	Key Index
1						
2						
3						
4						

Question 4: Do you want to play a game?

Assume you are playing tic-tac-toe with your friend. You are X and your friend is O. You've each taken 3 turns and the board now looks like this:



A) To help you make your next move as X, draw the complete **game tree** for the final three moves. Mark whether each final board is a win, lose, or tie for X.

B) Where will you decide to place your next X? How does the game tree guide you to that decision?

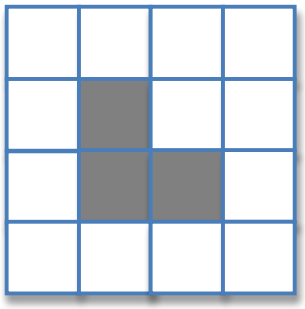
5) What is the meaning of Life?

Imagine you are asked to simulate the Game of Life. Remember, cells are placed on a 2-D grid; each cell can be either alive (black) or dead. The next generation of cells is calculated from the previous generation using a set of rules. For each cell, we can determine if it will be alive or dead in the next generation depending upon the current state of its 8 nearest neighbors (the 8 nearest neighbors are the cells directly adjacent above, below, left, right, and the four diagonal cells). We use the following rule:

If (cell is alive)
- If < 2 neighbors are alive, then the cell dies
- If > 3 neighbors are alive, then the cell dies
- If 2 or 3 neighbors are alive, then the cell stays alive

If (cell is dead)
- if 3 neighbors are alive, then the cell becomes alive

Imagine the world begins in this initial state.



A) On the grid above, show the number of the alive neighbors for each of the 16 cells.

B) On the grid below, show the state of the cells in the next generation. Cells which are alive should be filled in with black while dead cells are left empty.