STS 350

Exam #1

Name _____

Friday, February 16
100 pts.

The primary assumption of Cognitive Science is that cognition is computational. As we have examined this thesis so far we have looked at several initial points of view, have taken an initial look at what we mean by "computational" (we will examine this in further detail later), and have started to look at ways in which researchers have tried to provide some evidence for this thesis by conducting experiments in the creation of programs exhibiting intelligent behavior.

I. Some definitions (and such)

a. (5 pts.) What is the fundamental assumption of Cognitive Science as we have explored it so far in this course?

b. (5 pts.) What is the Turing - Church hypothesis / conjecture, and how does it relate to this fundamental assumption?

c. (5 pts.) Thagard expands the fundamental assumption into CRUM. What do the letters stand for, and what does this assumption mean?

d. (5 pts.) At which of Marr's three levels of explanation does CRUM primarily appear?

e. (5 pts.) The word 'algorithm' appears in a number of places in our discussion so far, and is a fundamental part of the primary assumption. What is an algorithm?

f. (15 pts.) Another way to express the fundamental assumption of Cognitive Science is that we are trying to understand human cognition as information processing. David Marr has taught us a way to explain an information processing system in three levels. What are these levels (name and briefly describe them), and how do they relate to each other? As a part of your explanation use the idea of a mechanical calculator (as done in class)

g. (10 pts.) Trying to decide what constitutes intelligent behavior is very difficult. Turing made a slightly tongue-in-cheek stab at the problem with the Turing Test. Describe the Turing Test. Please do not describe the imitation game instead. A diagram in addition to text would be helpful.

h. (10 pts.) Descartes probably would not agree with our fundamental assumption or with Thagard's CRUM hypothesis. Using only the reading we started the course with, what might be one of Descartes' objections?

II. Computation. One question to address in this course what does it mean for cognition to be computational? What does it mean for anything to be computational? To work towards an answer to this question, we have examined a computer and the basic elements of a programming language, LISP.

a. (10 pts.) We discussed an architectural sketch of a computer, naming its parts. Provide brief descriptions of the basic parts of the computer as listed below, together with a brief sketch. It is not sufficient simply to say what the letters mean.

ALU

Control Unit

Memory

b. (10 pts.) In our discussion on computers, we listed several things a computer can do. Please list these five things, and give brief examples from LISP to illustrate each one.

c. (10 pts.) What is the instruction-fetch-execute cycle, and what steps would be followed in executing the instruction to add the contents of memory location A and memory location B and place the result in memory location C ($C \leftarrow A + B$).

c. (10 pts.) Please write LISP expressions for each of the following. Do not simplify.

Calculate (5*2) - (6/3)

Calculate b*b - 4*a*c (where a, b, and c are variables each having some value)

Find the third item in the list **lst**.

Make a new list from **lst** with the third item removed. For example, from '(a b c d) we want to get '(a b d).