Homework 1 - Due at Lecture on Mon, Jan 30th

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Instructions: You must do this homework **alone**. Please hand in ONE copy of the homework that lists the **section number**, full **names** (as appear in Learn@UW) and **UW ID.** You must **staple** all pages of your homework together to receive full credit

Problem 1 (2 points)

1. What is the web address of the course home page? (i.e. http://...)
   http://pages.cs.wisc.edu/~karu/courses/cs252/spring2012/wiki/index.php?n=Main.HomePage

2. What is the secret word posted on the Piazza discussion board by the course instructor
   Freezing rain

Problem 2 (4 points)

(This question has no wrong answers.)

1. What is your expected major(s)?
2. Have you taken any other Computer Science courses? If yes, please list them.
3. Why are you taking this course?
4. What do you hope to get out of it?

Problem 3 (3 points)

Two computers, P and Q, are identical except that P has an add instruction and Q does not. Both have a subtract instruction. Can computer P solve more problems than computer Q? Why or why not?

B can implement subtract by doing a negation followed by an addition. Since both computers can implement all the same instructions, they are both able to solve the same number of problems. (6 points)

Problem 4 (4 points)

List 3 computing devices at your home. Are these Digital or Analog?
What difficulty with analog computers encourages computer designers to use digital designs

Devices such as Computers(Desktops/Laptop), Smartphones, Calculators are usually Digital.
What difficulty with analog computers encourages computer designers to use digital designs
Accuracy : It is very difficult to build accurate analog machines.

Problem 5 (2 points)

Name two different Instruction Set Architectures (ISAs).

Examples (there are many others):
x86 (a.k.a. IA-32), IA-64, PPC, ARM, Sparc, UltraSparc, MIPS, Alpha, VAX.

Problem 6 (3 points)

Consider the sentence: "The lady hit the man with the shoe"

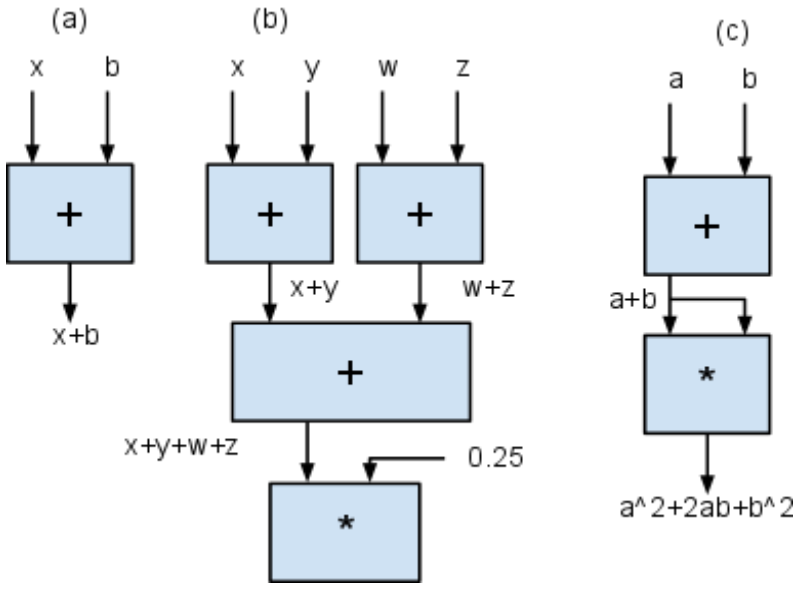
How many reasonable (or unreasonable) interpretations can you provide for this statement? List them. What property does this sentence demonstrate that makes it unacceptable as a statement in a program.

The statement is ambigous.
The lady hit the man, she hit him with an umbrella
The lady hit the man, the man was carrying an umbrella
are possible explanations.

Problem 7 (6 points)

Say we had a "black box," which takes two numbers as input and outputs their sum. See Figure 1(a). Say we had another box capable of multiplying two numbers together. See Figure 1(b). We can connect these boxes together to calculate p × (m + n). See Figure 1(c). Assume we have an unlimited number of these boxes. Show how to connect them together to calculate:

1. x+b
2. The average of the four input numbers w,x,y and z
3. a^2+2ab+b^2 (Can you do it with one add box and one multiply box?)



Problem 8 (4 points)

Abstraction is a key notion in computer world. It allows us to not get bogged down in details and work efficiently. One example is the usage of the high-level languages, which makes it possible for the programmers to focus on the tasks they try to accomplish and write 'machine independent' codes. Now try to demonstrate the notion of abstraction with a real life example. First, find a task (i.e., bake a cake or send a mail) you want to accomplish and describe the steps how you plan to do it in general. Then, break down each step into more detailed steps.

For example:
Mail a letter to a friend
1. Write a letter
1.1 Find a piece of paper
1.2 Find a pen
1.3 Write the letter
2. Put the letter inside an envelop.
....
3. Go to the post office.
....
4. Pay for the postage.
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