HW1 Solutions

Problem 1 (4 points)

a. List the web address of the course home page. (i.e. http://...)
   http://pages.cs.wisc.edu/~rrahulnayar/cs252/Spring2017/

b. List the date, time, and location of all the exams for this course.
   4 exams. All in the same room as the lecture.
   Friday, Feb 10
   Wednesday, March 8
   Friday, April 7
   Wednesday, May 3

c. Do you have a conflict with any of the exams? If yes, have you informed your instructor about the conflict?
   Any answer

d. Do you have a final exam for this course? If so, what is its date, time and location.
   No

Problem 2 (4 points)

   (This question has no wrong answers.)

a. What is your expected major(s)?
   Any answer

b. Please list all computer science courses you have taken in the past, if any.
   Any answer

c. Please list all computer science courses you plan on taking concurrently, if any.
   Any answer

d. Why are you taking this course? What do you hope to get out of this course?
   Any answer

Problem 3 (3 points)

a. List at least one advantage of programming in high-level languages compared to low-level languages. List one disadvantage.

   Advantage: High-level languages are independent of the platform, and easier to program.
   Disadvantage: High-level languages have limited access to low-level hardware functionalities.
   They have to be compiled first. They can be slow.
b. Explain the difference between a compiler and an assembler.

Compiler: Converts high-level languages to ISA
Assembler: Converts assembly language to ISA.

Problem 4 (5 points)

a. List at least two things specified by an ISA.

(Any two)
The set of instructions a computer can carry out.
Operations the computer can perform. (And number)
Data needed by each operation.
Operand representation. (Data type)
Mechanisms used to figure out where operands are located (Addressing modes).
Number of unique locations in memory.
Number of bits for each location in memory.

b. The ISA specifies the logic devices which can be used to implement a microarchitecture.
True/False? False

c. Briefly explain the difference between microarchitecture and ISA.

ISA specifies the set of instructions we want the hardware to carry out.

Microarchitecture is an organization of the blocks that will implement the ISA.

d. Can there be more than one logic circuit implementation for a microarchitecture? Yes

Problem 5 (3 points)

Consider the following statement: "Tomorrow will be colder."

a. What property does the statement demonstrate that makes it unacceptable in a program?

Ambiguity

b. The above statement is used as a step in an algorithm. Does this step have “definiteness”? Why/Why not?

No. Definiteness means each step should be precisely stated. In the above statement, tomorrow can be any day of the week, and colder can be relative, and have multiple meanings.

Problem 6 (4 points)

Assume that we have two "black boxes", shown in Figure (a) and (b). Black box shown in Figure (a) takes two numbers as input and outputs their sum. Black box shown in Figure (b) takes two numbers as input, and multiplies them together. As an example, Figure (c) shows how we can connect these boxes together to compute $p \times (m + n)$.
a) $m^2 + n^2$

(b) $m \times n$

(c) $p \times (m + n)$

a) $m^2 + n^2$
b) \((m+n)^4\)