Homework 1 [Due at lecture on Wed, Jan 29]

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

Problem 1 (4 points)

a. How many Midterm exams do you have for this course? What are the dates on which they are held? In what room and building are your exams?

4 Midterms:

(1) February 07, Friday
(2) March 12, Wednesday
(3) April 09, Wednesday
(4) May 09, Friday

In classroom, during class hours

b. Do you have a conflict with any of the exams? If so, have you informed your instructor about the conflict?

No wrong answer

c. Do you have a final exam for this course?

No

Problem 2 (3 points)

(This question has no wrong answers.)

a. What is your expected major(s)?
b. Have you taken any other Computer Science courses in the past? If yes, please list them.
c. What do you hope to learn from this course?

Problem 3 (2 points)

What is the difference between a high level language and an assembly language?

A high level language is machine independent. Assembly language is tied to the machine on which the programs execute.

Problem 4 (3 points)

Name at least three things specified by an Instruction Set Architecture (ISA).

Instructions, Data Types, and Addressing Modes.

Problem 5 (2 points)

In your own words, explain how does a microarchitecture differ from an ISA? Why do you think we might want to design a different microarchitecture for an existing ISA?

The microarchitecture specifies how circuits are put together to create the computer. The Instruction Set Architecture (ISA) provides an interface which specifies what sort of instructions a computer supporting this interface can perform.

We would do this for a number of reasons. Primarily, requirements could be different for different systems. For example, Servers require very high performace, so the microarchitecture should be designed accordingly. Servers does not put a major limitation on cost/ power. However other systems like mobile devices require a good performance at low cost, without significant power dissipation. The key to note here is that (other than hopefully an improvement in performance / cost / power) the actual user sees no difference when programming or running the computer.

Problem 6 (3 points)

Frank said : "I saw the man on the ship with a telescope"

a. How many reasonable interpretations can you provide for Frank's statement. List them.
b. What property does this sentence demonstrate that makes it unacceptable as a statement in a program.

a)There are two reasonable interpretations of this statement:

- a. Frank saw a man on the ship and the man had a telescope.
- b. Frank saw a man on the ship using his telescope.

b) It is ambiguous. So it cannot be a statement in a program as the computer will not understand what it means.

Problem 7 (3 points)

If your father asks you to "Order a Pizza online", is it an abstraction? If so, break it down into a few of its component parts.

Yes, it is an abstraction.
A few of the component parts are:
1. Switch on your computer if (it is off)
2. Open the web browser and type the link address of the pizza delivery website at the address bar to go to open the webpage
3. Use the instructions in the webpage to login and order the pizza
4. Give the correct address to deliver
5. Pay the bill using using some method (debit/credit cards or online banking)
...

Problem 8 (5 points)
Assume that we had a "black box," which takes two numbers as input and outputs their sum, as shown in Figure 1(a). Also assume that we had another box capable of multiplying two numbers together, as shown in Figure 1(b). We can connect these boxes together to compute p × (m + n), as shown in Figure 1(c).

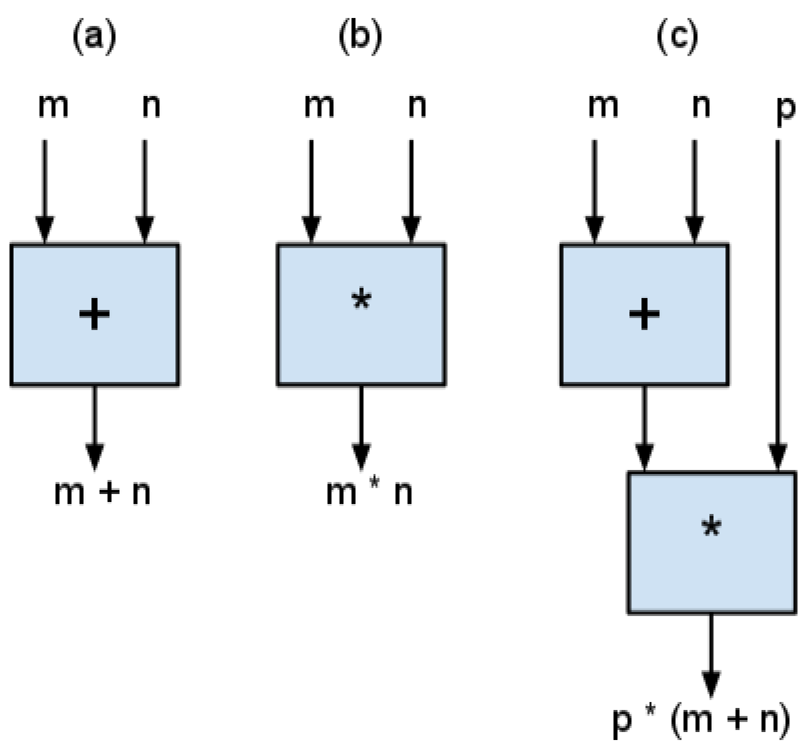


Fig 1. "Black boxes" capable of (a) Addition, (b) Multiplication and (c)A combination of both
Now, assume we have unlimited number of these boxes (ie, the ones shown in Fig 1(a) and 1(b)).

a) Show how to connect them together to compute:

(i) 2a + 2b

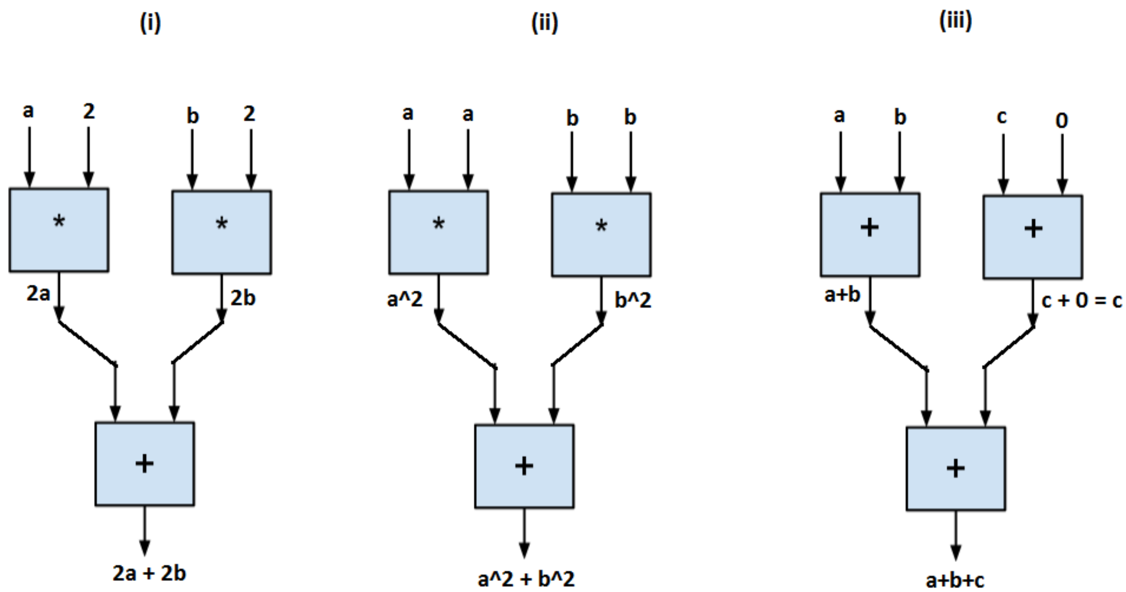
(ii) a^2 + b^2

(iii) a + b + c

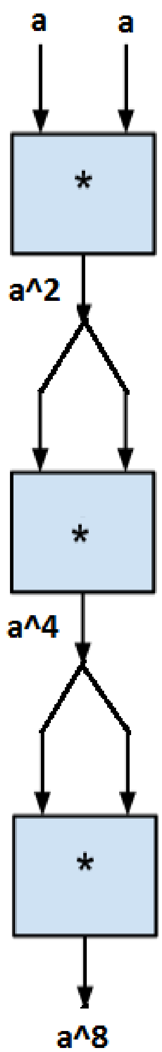
b) What is the minimum number of boxes required to compute a^8? Also, show the connections involved.

Solutions:

a)



b)



Problem 9 (5 points)

In the table below, fill in the number of the concept (1 through 5) that best matches the corresponding statement:

1) Definiteness
2) Effective Computability
3) Finiteness
4) Abstraction
5) Language/Code

2	Determines whether or not a problem is solvable
4	Underlying mechanisms are hidden or unknown
1	Each step of a process must be clearly laid out
5	Can be used to write an algorithm that a computer can understand
3	Will not run on forever, will stop at some point