**CS173: Intermediate Computer Science**

**Reading 1**

Name: \_\_\_\_\_\_\_\_\_\_\_Daniel Lee\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Read the assigned pages below from our course textbook. Complete the responses to the questions in this document and then save as a docx or pdf file. Submit your work by the assigned deadline on the Canvas course page or in class. Responses may be neatly handwritten or typed. **Put your name at the top!**

Readings: From the course textbook please read Chapter 1.

You should come away with:

* a working knowledge of some important vocabulary
* an understanding of the problem solving process
* an idea of the components inside a computer
* an understanding of the role of software maintenance
* an understanding of how software engineering plays an important role in professional computing
* a list of ideas and techniques to solve difficult problems
* a brief history of C and C++

**1) Define the following terms:**

(a) Computer Program:

Instructions for solving a problem, to be performed by a computer.

(b) Algorithm:

A procedure for solving a problem in a finite amount of time.

(c) Documentation (as it relates to a computer program):

The written text and comments that make a program easier for others to understand, use, and modify.

(d) Machine Language:

The language, made up of binary-coded instructions, that is used directly by the computer.

(e) Assembler:

A program that translates an assembly language program into machine code.

(f) Compiler:

A program that translates a high-level language into machine code.

**2) Describe the difference between the Problem Solving Phase and the Implementation Phase. Explain why it is important not to be tempted to bypass the Problem Solving Phase and go straight to the Implementation Phase.**

Problem-Solving Phase focuses on understanding or defining the problem and what the solution must do. With this analysis and specification, we develop instructions for solving the problem, which is known as an algorithm. After developing an algorithm, we verify our algorithm to ensure that it solves the problem.

On the other hand, the Implementation Phase focuses on translating the algorithm into a programming language and going through the test to find out the source of the errors if they pop up and make corrections by manually checking the results from the computer that followed specific instructions.

It is important not to be tempted to bypass the Problem Solving Phase and go straight to the Implementation Phase because computers cannot analyze a problem and come up with a solution. Instead, a human must analyze the problem, develop instructions for solving the problem, and then communicate to the computer.

**3) Scan the section 1.3 on What's Inside a Computer. There are no questions for this topic, but I want you to get a cursory understanding of the main parts. This will be the central topic in CS281, but it is good to have a basic understanding for CS173.**

**4) What is the difference between how a C/C++ program is run versus a python program?**

When a C/C++ program runs, it is translated by a compiler, which translates the entire source program into machine language, after which execution of the object program takes place.

On the other hand, Python is translated by an interpreter rather than by a compiler when it runs. An interpreter translates and executes each instruction in the source program, one at a time.

**5) What is software maintenance?**

Software maintenance is modifying the program to meet changing requirements or to correct any errors that show up in using it.

**6) Why is software engineering an important aspect of computer programming? What can go wrong if we don't embrace the principles of software engineering?**

Software engineering is an important aspect of computer programming because programmers have a responsibility to develop software that is free from errors and this process used to develop correct software is known as software engineering. If we don’t embrace the principles of software engineering, there will be errors in the program that can have serious consequences, such as an error in the control software of the F-18 jet fighter, a failure in a rocket launch, or a radiation therapy machine killing patients due to its software error causing the machine to operate at full power.

**7) Describe the Divide-and-Conquer approach to problem solving.**

Divide-and-Conquer approach to problem solving is basically breaking up a large problem into smaller pieces that we can solve separately.

**8) Who invented the C programming language and when? Who invented the C++ programming language and when?**

Dennis Ritchie created the C programming language at AT&T Bell Labs in the late 1960s and early 1970s. Bjarne Stroustrup, also of Bell Labs, invented the C++ programming language in 1985.