**Practice 1.1 Find the answers to the following questions.**

1. **What are the origins of the three major computational models that early computer scientists developed?**

ANS:The origins of the three models are the Turing Machine, the *λ*-calculus, and propositional and predicate logic.

1. **Who were Alan Turing and Alonzo Church and what were some of their contributions to Computer Science?**

ANS: ALAN Turing as a PhDstudent of Alonzo Church. AlanTuring developed theTuring Machine and Alonzo Church developed the *λ*-calculus to answer prove there were somethings that are not computable. They later proved the two approaches were equivalent in their power to express computation.

1. **What idea did both John von Neumann and Alan Turing contribute to?**

ANS:Both von Neumann and Turing contributed to the idea of a stored-program computer.

1. **What notation did John Backus develop and what was one of its first uses?**

ANS4. Backus developed BNF notation which was used in the development of Algol 60.

1. **What year did Alan Turing first propose the Turing machine and why?**

ANS:1936 was a big year for Computer Science.

1. **What year did Alonzo Church first propose the *λ*-calculus and why?**

ANS:So was 1946. That was the year ENIAC was unveiled. Eckert and Mauchly designed and built ENIAC.

7**. Why are Eckert and Mauchly famous?**

1. **Why are the history of Mathematics and Computer Science so closely tied together?**

ANS:The problems in Mathematics were growing complex enough that many mathematicians were developing models and languages for expressing their algorithms.This was one of the driving factors in the development of computers and Computer Science as a discipline.

**Practice 1.2 Find the answers to the following questions.**

1. **What are the three divisions of data memory called?**

ANS1. The run-time stack, global memory, and the heap are the three divisions of data memory.

1. **When does an item in the heap get created?**

ANS2. Data on the heap is created at run-time.

1. **What goes in an activation record?**

ANS3. An activation record holds information like local variables, the program counter,

the stack pointer, and other state information necessary for a function invocation.

1. **When is an activation record created?**

ANS4. An activation record is created each time a function is called.

1. **When is an activation record deleted?**

ANS5. An activation record is deleted when a function returns.

1. **What is the primary goal of imperative, object-oriented programming?**

ANS6. The primary goal of imperative, object-oriented programming is to update memory

by updating variables and/or objects as the program executes. The primary

operation is memory updates.

**Practice 1.3 Answer the following questions.**

1. **What are some examples of functional languages?**

ANS1. Functional languages include Standard ML, Lisp, Haskell, and Scheme.

1. **What is the primary difference between the functional and imperative models?**

ANS2. In the imperative model the primary operation revolves around updating memory

(the assignment statement). In the functional model the primary operation is

function application.

3. **Immutable data is data that cannot be changed once created. The presence of**

**immutable data simplifies the conceptual model of programming. Does the imperative**

**or functional model emphasize immutable data?**

ANS3. The functional model emphasizes immutable data. However, some imperative

languages have some immutable data as well. For instance, Java strings are

immutable.

**Practice 1.4 Answer these questions on what you just read.**

1. **Howmany programs can you write in a logic programming language like Prolog?**

ANS1. You never write a program in Prolog. You write a database of rules in Prolog that

tell the single Prolog program (depth first search) how to proceed.

1. **What does the programmer do when writing in Prolog?**

ANS2. The programmer provides a database of facts and predicates that tell Prolog

about a problem. In Prolog the programmer describes the problem instead of

programming the solution.

**Practice 1.5 Answer the following questions.**

1. **Who invented C++? C? Standard ML? Prolog? Python? Java?**

ANS1. C++ was invented by Bjourne Stroustrup. C was created by Dennis Ritchie. Standard

ML was primarily designed by Robin Milner. Prolog was designed by Alain

Colmerauer and Philippe Roussel with the assistance of Robert Kowalski. Python

was created by Guido vanRossum. Javawas thework of the Green team and James

Gosling.

1. **What do Standard ML and Prolog’s histories have in common?**

ANS2. Standard ML and Prolog were both designed as languages for automated theorem

proving first. Then they became general purpose programming languages later.

1. **What do Prolog and Python have in common?**

ANS3. Both Python and Prolog run on virtual machine implementations. Python’s virtual

machine is internal to the interpreter. Prolog’s virtual machine is called WAM

(Warren Abstract Machine).

1. **What language or languages is Standard ML based on?**

ANS4. Standard ML is influenced by Lisp, Pascal, and Algol.