Introduction

(Solutions to Review Questions and Problems)

Review Questions

Q1-1. Turing proposed that all kinds of computation could be performed by a special kind of a machine. He based the model on the actions that people perform when involved in computation. He abstracted these actions into a model for a computational machine that has really changed the world.

Q1-3. Based on the Turing model a program is a set of instruction that tells the computer what to do.

Q1-5. The subsystems of the von Neumann model are memory, the arithmetic/logic unit (ALU), the control unit, and the input/output.

Q1-7. The arithmetic/logic unit (ALU) is where calculations and logical operations take place.

Q1-9. The input subsystem accepts input data and the program from outside the computer; the output subsystem sends the result of the processing to the outside.

Problems

P1-1. To solve a problem, a computer follows a set of instructions called a program, This set of instructions is written based on the paper-and-pencil solution to the problem. If there is no solution to the problem outside of the computer, we cannot write such a program.

P1-3. In the Turing model, a computer consists of input data, output data and a program. Pascaline calculator, which is an addition/subtraction machine, is not a computer according to this model because it lacks the program component.

P1-5. In the Turing model, a computer consists of input data, output data and a program. In the Jacquard Loom, a program (punch cards) was used to control the output (the pattern of the loom's weave). Therefore, based on the Turing model, it is a computer.

P1-7. The first computer based on the von Neumann model was first considered to be ENVAC (made in 1950). However, there has been controversy and court battle and in 1973 District Court invalidated the ENIAC patent and concluded that the ABC (made in 1950) was the first computer.