# Book Review Questions

## Q7 – The following instructions are written in Vole Machine language. Translate them into English

### A – 0x7123

OR the bit patterns in registers 0x2 & 0x3, placing the result in register 0x1.

### B – 0x40E1

Move the bit patterns located in register 0xE to register 0x1

### C – 0xA304

Rotate the bit pattern in register 0x3 4 times – placing the bit at the low-order end into the higher-order end.

### D – 0xB100

Jump to the instruction located in memory cell 0x00 if the bit pattern in register 0x1 is equal to the bit pattern in register number 0x0.

### E – 0x2BCD

Load register 0xB with the bit pattern 0xCD.

## Q8 – Suppose a machine language is designed with an op-code field of 4 bits. How many different instructions types can the language contain? What if the op-code field is increased to 6 bits?

A maximum of 16 instruction types could be included in a 4 bit opcode. A maximum of 64 is possible within a 6 bit opcode.

## Q10 – Rewrite the program in figure 2.7 assuming that the values to be added are encoded using floating point notation rather than twos complement notation.

0x156C

0x166D

0x6056

0x306E

0xC000

## Q15 – Suppose the memory cells at addresses 0x00 through 0x09 in the Vole contain the following bit patterns: {see book}. Assume that the machine starts with its program counter containing 0x00

0x00/01 – 0x1C03 – Load register C with bit pattern found in memory cell 0x03

0x02/03 – 0x2B03 – Load register B with bit pattern 0x03

0x04/05 – 0x5ABC – Add the bit patterns in registers B and C, storing the result in register A

0x06/07 – 0x3A00 – Store the bit pattern in register A in memory cell 0x00

0x08/09 – 0xC000 - Halt

### A – What will be in the memory cell at address 0x00 when the machine halts?

0x03

### B – What bit pattern will be in the program counter when the machine halts?

0x08

## Q19 – If the vole executes an instruction every microsecond (a millionth of a second), how long does it take to complete the program in Problem 18? {see book}

**Command Sequence:**

0xF0/F1 - 0x2000 – Load register 0 with value 0x00

0xF2/F3 - 0x2202 – Load register 2 with value 0x02

0xF4/F5 - 0x2304 – Load register 3 with value 0x04

0xF6/F7 - 0xB3FC – Jump to instruction in memory cell FC if bit pattern 3 is the same as what’s in register 0

0xF8/F9 - 0x5002 – Add bit patterns in register 0 and 2, storing them in register 0

0xFA/FB - 0xB0F6 – Jump to instruction in memory cell F6 if bit pattern in register 0 is equal to bit pattern in register 0.

0xFC/FD - 0xC000 – Halt execution

## Q51 – Suppose a machine has 200gb of storage space available on a hard disk and receives data over a broadband connection at 15Mbps. At this rate, how long will it take to fill the available storage space

Formula: Total Size (MB) / (Mbps/8) = X seconds

As equation says GB, 1000mb has been assumed. Total time is 106666.7 seconds (29.62 hours).

## Q52 – Suppose a satellite system is being used to receive a serial data stream at 250Kbps. If a burst of atmospheric interference lasts 6.96 seconds, how many data bits will be affected?

Formula: Stream (Kbps) \* interference time (s) = Kilobits affected

(Stream (Kbps) \* interference time (s)) \* bits (in a kilobit)

(250\*6.96)\*1000 = 1740000

## Q55 – Identify two approaches to increasing throughput

Increasing throughput can be performed by one of the following:

* Implementing pipelining (Allowing steps in the machine cycle to overlap)
* Fetching multiple instructions at the same time and running them in parallel providing they aren’t dependent on each other. **(clock speed)**