1)The Z80 microprocessor has 16-bit Address bus. How many memory locations the CPU can access?

2) The Z8000 microprocessor has 16-bit Address bus and a 16-bit Data bus. What is the maximum size of the memory that the microprocessor can handle?

3) The ALPHA microprocessor has 16-bit Address bus. Its Instruction Pointer (Programe Counter) register is only 10-bit wide. What is the size of the largest machine language program that the CPU can handle?

4)

Table below shows the number of clock cycles required by different types of tasks carried by a CPU during an instruction cycle

Task	Number of memory cycles
Reading from memory	4
Writing to memory	6
Decoding an instruction	2
ALU operation involving internal registers	4
Other operations involving internal registers	2
All other operations	0

Consider the following machine language program

```
1000:LOAD A,<n>          #Load A from memory following OpCode
1002: LOAD B,<125>       #Load B from memory address <125>
1004: ADD B
1005: LOAD B,A
1006: ADD B
1007: STORE A,<126>      #Store register B at memory address 126
```

a. Determine the number of clock cycles required by each instruction in the program

b. If the above CPU runs at 1MHz clock, how long the program would require to execute?

c. What is the average clock cycles per instruction in the above program

d. Calculate the throughput of the above program in terms of MIPS if the CPU runs at 1MHz

Answers

1) 2^{16}

2)2 byte x64k = 128kB

3)1024

4) a)4+2+4=10
4+2+4+4=14
4+2+4=10
4+2+2=8
4+2+4=10
4+2+4+6=16

10+14+10+8+10+16=68

b) 1 clock time =1/1MHz=1microsecond
program time =68microsecond

c) 68/6= 11.3333

d)1/11.3333microsecond=0.0882MIPS