Assignment 12

1.(4 points)

A) Convert the binary number $(111.111)_2$ to decimal.

B) Convert $(12.A)_{16}$ to binary.

C) Convert $(1110111)_2$ to hexadecimal.

D) Convert $(AF10)_{16}$ to binary.

2.Read the following pseudo-code and answer the question(2 points)

```
INSERTION-SORT(A)
1  for j = 2 to A.length
2      key = A[j]
3      // Insert A[j] into the sorted sequence A[1 .. j − 1].
4      i = j − 1
5      while i > 0 and A[i] > key
6          A[i + 1] = A[i]
7          i = i − 1
8      A[i + 1] = key
```

1)What are the correct intermediate steps of the following data set when it is being sorted with the Insertion sort? 15,20,10,18

A. 15,20,10,18 -- 10,15,20,18 -- 10,15,18,20 -- 10,15,18,20

B. 15,18,10,20 -- 10,18,15,20 -- 10,15,18,20 -- 10,15,18,20

C. 15,10,20,18 -- 15,10,18,20 -- 10,15,18,20

D. 10, 20,15,18 -- 10,15,20,18 -- 10,15,18,20

2)Consider the following lists of partially sorted numbers. The double bars represent the sort marker. How many comparisons and swaps are needed to sort the next number. [1 3 4 8 9 || 5 2]

A. 2 comparisons, 3 swaps

B. 3 comparisons, 2 swaps

C. 4 comparisons, 3 swaps

D. 3 comparisons, 4 swaps

3.Answer the following questions about Appendix C. (3 points)

1)The following are instructions written in the machine language described in Appendix C. Translate them into English.(2 points)

a. 7123:

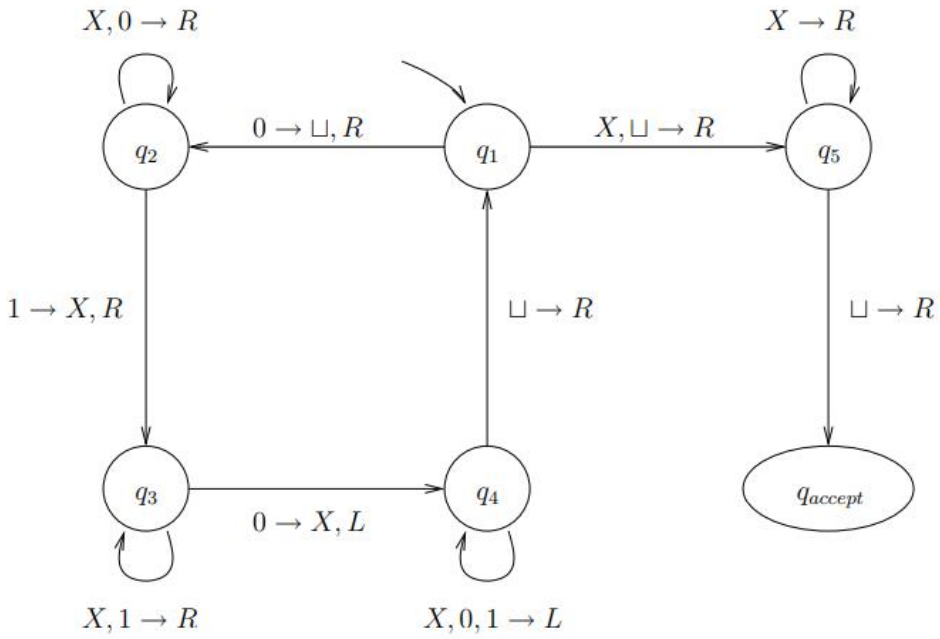
b. 40E1:

2)If the machine is started with its program counter containing 00, what bit pattern is in register 6 when the machine halts?(1 point)

	PC	Machine Language
1st	00	2655
2nd	02	C000

Address	Contents
00	26
01	55
02	C0
03	00

4.The following figure: M1. The input alphabet is Σ = {0, 1} and the tape alphabet is Γ = {0, 1, X, ⊔}.To save space, the reject state has been omitted; any transitions not explicitly shown go directly to the reject state q_{reject}.



Show the sequence of configurations that M1 enters into on the following input strings. Note that any transitions not explicitly shown in the diagram go directly to the reject state, qreject (which also isn't shown in the figure) and move the tape head to the right without changing the tape contents.(1 point)

- **⊔ 01 ⊔**