

# COE 205 Computer Organization & Assembly Language – Fall 2004

**Assignment 4:** Arrays and Loops  
**Professor:** Muhamed Mudawar  
**Due Date:** Monday, November 22, 2004

**Q1.** (5 pts) Write an assembly language program that reads a 32-bit hexadecimal number, counts, and prints the total number of 1's in its binary representation. A sample run is shown below, where user input is shown in **bold**. The program should validate user input.

```
Enter hex number (max 8 digits): A35012FE  
Number of 1's in binary representation = 15
```

**Q2.** (15 pts) Write an assembly language program to detect sequences inside an 8 by 8 matrix of characters. A detected sequence should have identical characters and a minimum length within a given row or column. The user inputs an 8 by 8 matrix of characters and specifies the minimum length of the sequence. Your program should scan all the rows and all the columns to detect sequences. A detected sequence should be displayed, by specifying its row or column number, the length of the sequence, the character of the sequence, and the starting position of the sequence. A sample run is shown below, where the user input is shown in **bold**.

```
Enter minimum sequence length (2 to 8): 4  
Enter an 8x8 matrix of characters:  
aaaabccb  
baaaabaf  
cabdebcg  
aabbbbbbb  
abbaabca  
bbbbbbcb  
cccccccc  
cdddddcd
```

The following sequences have been detected:

```
Row 1: 4 a starting at position 1  
Row 2: 4 a starting at position 2  
Row 4: 6 b starting at position 3  
Row 6: 6 b starting at position 1  
Row 7: 8 c starting at position 1  
Row 8: 5 d starting at position 2  
Col 2: 4 a starting at position 1  
Col 3: 4 b starting at position 3  
Col 6: 5 b starting at position 2  
Col 7: 4 c starting at position 4
```

Make sure to validate the minimum sequence length. Document your code and make it as readable as possible. 20% of the mark will go to documentation and readability and 80% will go to correctness. Put the source and executable files of each program in a separate folder. Call these folders A4Q1 and A4Q2, for assignment 4 questions 1 and 2, respectively. Write your name, your id, the date, the objective of the program, the input, and the output at the beginning of each program. Submit both programs on a floppy disk along with a hard copy in a sealed envelop at the beginning of class time.