CS321: Quiz-2 (100 points)

1. Consider the following code, being executed on a Little Endian Pentium machine where

- `sizeof(int) == 4; sizeof(int *) == 4; sizeof(char) == 1`

For each of the following assignment statements, fill in the blanks in the comments to indicate the result of the assignment. All answers must be in hex.

```
int main() {
int array[2];
int  *ptr;
int x; char c;
array[0] = 0xaabbccdd;
array[1] = 0x44556677;
ptr = array;
x = *((int *)ptr + 1);
/* x = 0x_____*/
c = *((char *)ptr + 1);
/* c = 0x_____*/
x = *((char *)ptr + 1);
/* x = 0x_____*/
c = *((int *)ptr + 1);
/* c = 0x_____*/   }
```

(16 points)

ANS:

****

x = 0x44556677
c = 0xcc
x = 0xffffffcc
c = 0x77

2. What will be the value in AX after executing the following instructions? Give the answer in hexadecimal.

```
mov al,15          AX=.....??
mov ah,15          AX=.....??
xor al,al          AX=.....??
mov cl,3           AX=.....??
shr ax,cl          AX=.....??
add al,90h         AX=.....??
adc ah,0           AX=.....??
```

(8 points)

```
mov al,15 AX=??0F CL=??
mov ah,15 AX=0F0F CL=??
xor al,al AX=0F00 CL=??
mov cl,3 AX=0F00 CL=03
shr ax,cl AX=01E0 CL=03
add al,90h AX=0170 CL=03 CY=1
adc ah,0 AX=0270
```

___0270h_____

___0000 0010 0111 0000

(8 points)

3.

A) Given that the IP = 1230H and CS = 0100H

a) What is the physical address of the code.
b) Write 5 possible values of the IP and CS such that it would address the same physical memory address as in (a).

(15 points)

(a)Physical address =1230+010000=02230

(b) Some samples are

IP = 1220H and CS = 0101H
IP = 1210H and CS = 0102H
IP = 1240H and CS = 0099H
IP = 1250H and CS = 0098H
IP = 1260H and CS = 0097H

4. Given the following declaration of `table1`

```
table1 DW 10 DUP (0)
```

fill in the blanks in the following code:

```
mov SI, _______ ; SI = displacement of 5th element

mov AX,table1[SI]
cmp AX, _______ ; compare 5th and 4th elements
```

(10 points)

ANS:

```
mov SI, __8_____ ; SI = displacement of 5th element

mov AX,table1[SI]
```

```
cmp AX, __[SI-2]__________ ; compare 5th and 4th elements
```

0	1 st
1	
2	2nd
3	
4	3rd
5	
6	4th
7	
8	5th
9	
10	6th
11	
…	..

5. **Given the following delay subroutine, determine the time delay when the routine is called.**

```
Delay:  mov AX, 0x20
        mov CX,AX
Repeat: dec  CX
        jz repeat
        iret
```

Assume that no. of clk cycles as follows: mov (1 cycle); dec (1, 2 if the result is 0); And goto, iret (2). The processor operates at 1 MHz..

(6 points)

ANS

```
Delay:  mov AX, 0x20    1 cycle
        mov CX,AX       1 cycle
Repeat: dec  CX
        jz repeat       } 3cycles x 31 + 2 cycles + 2 cycles
        iret
```

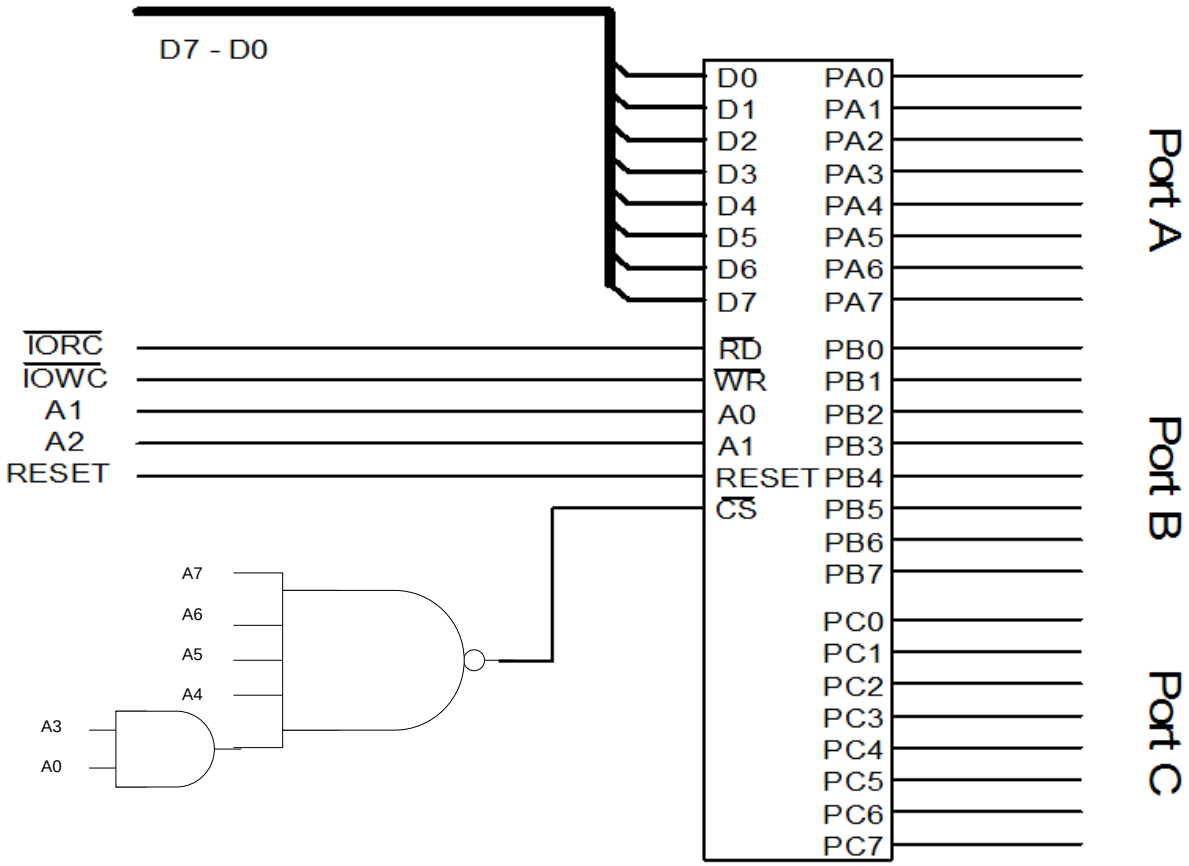
Delay = 1+1+3x31+2+2=99us

Q6: Answer the following questions about x86 stack
a. How does the call instruction modify the stack?
b. How does the ret instruction modify the stack?
c. How are arguments passed to a function?
d. How are return values passed back to a calling function? **(10 points)**

Ans:

a. pushes return address onto stack (use push instructions)
b. pops return address off stack (uses pop instruction)
c. pushed onto stack in reverse order (e.g., push arg3, push arg2, push arg1)
d. in the ax register

7. How is 8255 (Programmable Peripheral Interface) configured if its control register contains 9B h. Compute Register address of Port A, Port B, Port C, and Control reg for the following interface.



(10 points)

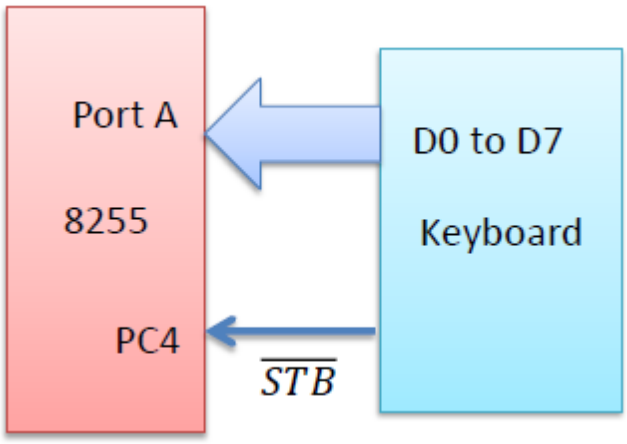
Ans:

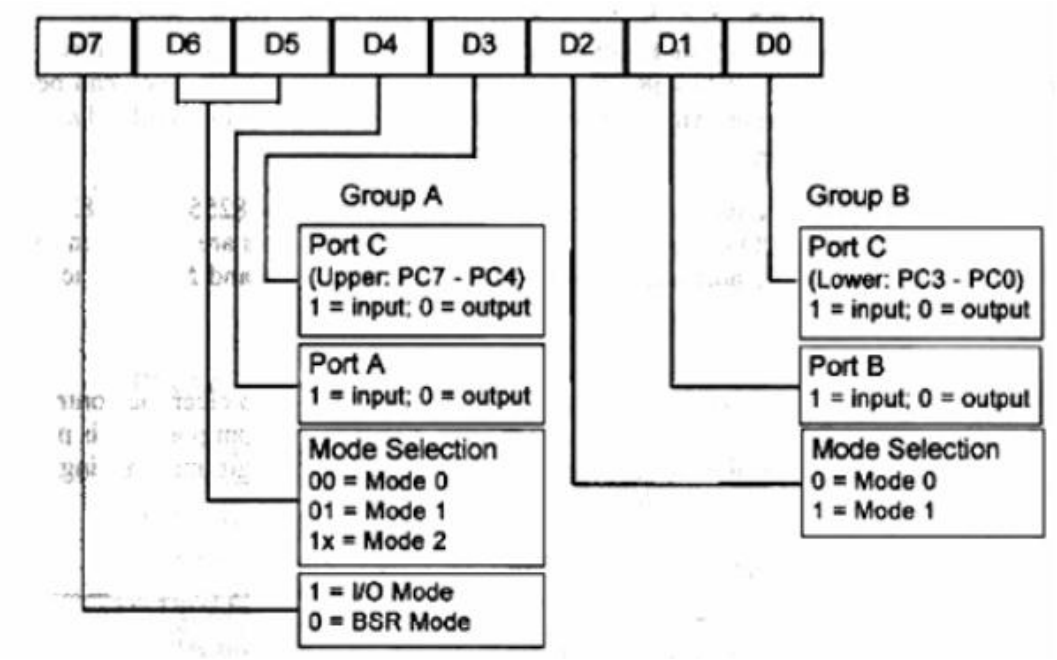
8255 (Programmable Peripheral Interface) configured as follows:

All ports are configured as INPUT port.

Address Port A: F3
Address Port B: F7
Address Port C: FB
Address Control port: FF

8. Write an 8086 assembly language program to read an ASCII character from a keyboard via PORTA of an 8255 PPI when PORT C bit PC4 is strobed low. Assume a PORTA Address of 20H. Figures show the block schematic and 8255 configuration bit information.





(25 Points)

```
.data
PORTA  EQU 0020H
```

```
PORTB EQU 0021H
PORTC EQU 0023H
CONTROL EQU 0023H

.code
MOV DX, CONTROL
MOV AL, 98 ; 10011000
OUT DX, AL  ; initialize PORTS
MOV DX, PORTC
Read1: IN DX, PORTC ; is  Strobe PC4 low
       TEST AL, 10H
       JNE READ1
       MOV DX, PORTA
       IN  AL, DX; Read ASCII Character
```