COSC 2329 **EXAM #1**

Dr. Tim McGuire *Sample*

1. Name the advantages of programming in assembly language.
2. Name the disadvantages of programming in assembly language.
3. What is another name for the register ax?
4. What is another name for the register cx?

For the next 4 problems, assume that A, B, and C are 16-bit signed integers stored in memory

5. Translate the assignment statement **`C = A + B`** into assembly language.
6. Translate the assignment statement **`A = – (A + 1)`** into assembly language.
7. Translate the assignment statement **`A = A - B`** into assembly language.
8. Translate the assignment statement **`C = A + B + B - 42`** into assembly language.

9. Perform the indicated operations using 8-bit two's complement arithmetic and indicate the sum and the state of **`CF`**, **`OF`**, **`SF`**, and **`ZF`**.

a)	b)	c)	d)
`01010101`	`01111111`	`11111111`	`10101010`
`+10101011`	`+01111111`	`+11111111`	`+10110001`
`CF = _____`	`CF = _____`	`CF = _____`	`CF = _____`
`OF = _____`	`OF = _____`	`OF = _____`	`OF = _____`
`SF = _____`	`SF = _____`	`SF = _____`	`SF = _____`
`ZF = _____`	`ZF = _____`	`ZF = _____`	`ZF = _____`

10. Convert $C42B_{16}$ to binary:
11. Express 31_9 as a base 3 number.
12. Convert the signed 16-bit binary number 1111111111111101_2 to base 10.
13. Convert 0111 0100 1100 0010 from binary to hexadecimal.
14. Write the truth table for the XOR operation.
15. Convert **`-2`** to 8-bit binary using:
    a) sign-magnitude
    b) 1's complement
    c) 2's complement

16. Express $\mathbf{1000000100101010010011111_2}$
    a) as an octal number
    b) as a hexadecimal number

17. Suppose a program contains the lines

```
call  proc1
mov   ax,bx
```

    and: (a) instruction **`mov ax,bx`** is stored at **`7300`**h; (b) **`proc1`** is a procedure that begins at **`address ABCh`**; (c) **`sp`** = **`00F2`**h. What are the contents of **`ip`** and **`sp`** just after **`call proc1`** is executed? What word is on top of the stack?

18. Suppose **`sp`** = **`01FA`**h and the top of the stack = **`2046`**h. What are the contents of **`ip`** and **`sp`** after **`ret`** is executed?

19. Suppose **al** contains **11010010**b and **cf** = **0**. Give the new contents of **al** and **cf** after each of the following instructions is executed. Assume the preceding initial conditions for each part of this question.

```
shl   al, 1
shr   al, 1
ror   al,cl  if cl contains 2
sar   al, cl  if cl contains 2
rcr   al, 1
rcl   al, cl  if cl contains 3
```

20. Give a logic instruction to do each of the following:
    a) Clear bits 0 and 7 of **al**, leaving the other bits unchanged.
    b) Set bits 0, 2, 4, 6, 8, 10, 12, and 14 bits of **bx**, leaving the other bits unchanged.
    c) Complement the least significant bit of **dl**, leaving the other bits unchanged.
    d) Replace the value of the byte variable `BYTE1` by its one's complement.

21. Using shift instructions, multiply the **ax** register by 8. Assume unsigned arithmetic.

22. Using shift instructions, divide the **bx** by 4. Assume signed arithmetic.

23. Write assembly code for the following decision structure:

    while **ax** > 1 **do**
        divide **ax** by 2 *using a signed shift instruction*

    endwhile

24. Write a procedure which will accept a character as input in **al**. If it is a lowercase letter, convert it to uppercase; otherwise, leave it unchanged.

25. Write assembly code for the following loop structure:

    for 100 times **do**
        increment **ax** *by one*

    endfor

26. Translate the following into Intel assembly language assuming that all variables are 16-bit signed integers in memory:
    a) **a = b * c;**
    b) **d = e/f; g = e % f;**
    c) **h = i – j*k/m;**