

Introduction to Architecture and Assembly Midterm

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CSE3020: Section 01

October 3rd, 2018

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1 5.8.2-1

Write a sequence of PUSH and POP instructions to exchange the values of EAX and EBX.

Answer:

```
PUSH EAX
PUSH EBX
POP EAX
POP EBX
```

2 5.8.2-2

Suppose you wanted a subroutine to return to an address that was 3 bytes higher in memory than the return address currently on the stack. Write a sequence of instructions that would be inserted just before the subroutine's RET instruction that accomplish this task.

Answer:

```
subProc PROC
POP EAX
ADD EAX, 3
PUSH EAX
RET
subProc ENDP
```

3 4.9.2-10

Write a sequence of instructions that set both the Carry and the Overflow flags at the same time.

Answer:

```
mov al, 80h
add al, 80h
```

4 4.9.2-4

Write a code using byte operands that adds two negative integers and causes the overflow flag to be set

Answer:

```
mov al, -100
add al, -50
```

5 3.9.2-13

Declare a string variable containing the word "TEST" repeated 500 times

Answer:

```
TESTARRAY BYTE 500 DUP("TEST")
```

6 1.7.1-25

Create a truth table to show all possible inputs and outputs for the Boolean function described by $\text{NOT}(A \text{ OR } B)$.

Answer:

A	B	$A \vee B$	$\text{NOT}(A \vee B)$
T	T	T	F
T	F	T	F
F	T	T	F
F	F	F	T

7 1.7.1-15

What is the decimal representation of each of the following signed binary numbers?

(a) 10110111

(b) 00111010

(c) 11111000

Answer:

a.) Starts with 1, this means it is signed. Use 2's complement

10110111 \rightarrow 01001001

$$2^0 + 2^3 + 2^6 = 1 + 8 + 64 = 73$$

-73

b.) Starts with 0, therefore the number is positive:

$$2^5 + 2^4 + 2^3 + 2^1 = 32 + 16 + 8 + 2 = 58$$

58

c.) Starts with 1, this means it is signed. Use 2's complement

11111000 \rightarrow 00001000

$$2^3 = 8$$

-8

8 4.10-5

Write a program that uses a loop to calculate the first seven values of the Fibonacci number sequence described by the following formula: $\text{Fib}(1) = 1$, $\text{Fib}(2) = 1$, $\text{Fib}(n) = \text{Fib}(n-1) + \text{Fib}(n-2)$

Answer:

```
mov eax, 1 ;value of Fib(n)
mov ebx, 0 ;value of Fib(n-1)
mov ecx, 7 ;loop decrementer
mov edx, 0 ;value of Fib(n-2)
```

FIBONACCI:

```
    add eax, edx
    mov edx, ebx
    mov ebx, eax
    loop FIBONACCI
```