16.317: Microprocessor Systems Design I

Spring 2012

Lecture 10: Key Questions
February 13, 2012

1. Given the following initial state:
   - AX = 1234H
   - BL = ABH
   - Memory location SUM = 00CDH

Show the results of each step of the following instruction sequence. Be sure to track the carry flag throughout the sequence:

```
ADD AX, [SUM]
ADC BL, 05H
NEG BL
SUB AX, 12H
INC WORD PTR [SUM]
```

2. Describe the operation of the MUL and IMUL operations.

3. Describe the operation of the DIV and IDIV operations.

4. Explain the operation and usefulness of the CBW, CWDE, CWD, and CDQ instructions.

5. Explain the general operation of the AND, OR, XOR, and NOT instructions.

6. **Example:** Show the state of AL after each instruction in the following sequence:

```
MOV AL, 55H
AND AL, 1FH
OR AL, C0H
XOR AL, 0FH
NOT AL
```

7. Explain how logical operations can be used to clear, set, or flip one or more bits.

8. Explain the operation of shift instructions. What is the difference between SHR and SAR?