16.317: Microprocessor Systems Design I

Fall 2015

Lecture 8: Key Questions
September 21, 2015

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

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

3. **Example:** Given EAX = 00000005h and EBX = 0000FF02h, what are the results of the following instructions? Assume each instruction starts with the values shown above in EAX and EBX.

a. MUL BL

b. MUL BH

c. IMUL BH

d. DIV BL

e. DIV BH

f. IDIV BH

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

5. **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
```

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

7. **Example:** Given AL = 15H, CL = 03H, and CF = 0, show the state of AL and CF after each instruction in the sequence below:

```
SHL AL, 1
SHR AL, CL
SAL AL, 5
SAR AL, 2
```