# EECE.3170: Microprocessor Systems Design I

Fall 2016

Lecture 14: Key Questions
October 7, 2016

1. (Review) Describe the x86 loop instructions, as well as how these instructions can be used in a typical program.

2. Describe the operation of the following program.

What is the final value of SI if the 15 bytes between 0A001 and 0A00F have the following values?

00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E

```
        MOV   DL, 05
        MOV   EAX, 0x000A000
        MOV   ESI, 0
        MOV   CX, 0x000F
AGAIN:  INC   ESI
        CMP   [EAX+ESI], DL
        LOOPNE AGAIN
```

3. Describe the general structure and purpose of a subroutine.

4. Describe the basics of subroutines specific to the x86 instruction set.

5. Describe the operation of the CALL instruction.

6. Describe the operation of the RET instruction.

7. Explain the different instructions used to save state on the stack.

8. Explain the different instructions used to restore state from the stack.

9. **Example:** Assuming the initial state below, what is the resulting stack state of each of the following sequences?

EAX: 0x12345678
EBX: 0x0000000A
ECX: 0xFF0000FF
EDX: 0x00000000
ESI: 0x00000008
EDI: 0xFFFF0000
EBP: 0x00000400
ESP: 0x00002000

a. PUSH BX
   PUSH AX

b. PUSH EBX
   PUSH EAX

c. PUSHA