EECE.3170: Microprocessor Systems Design I
Summer 2017

Lecture 7: Key Questions
June 1, 2017

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

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

3. Describe the operation of the CALL instruction.

4. Describe the operation of the RET instruction.

5. **Example:** Assuming AX = 2 and BX = 4, show the results of the following sequence.
    Assume the addresses of the first three instructions are CS:0005, CS:0008, and CS:0009,
    respectively:

```
        CALL  SUM
        RET                     ; End main function
SUM PROC NEAR
        MOV   DX, AX
        ADD   DX, BX
        RET
SUM ENDP
```

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

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

8. **Example:** Assuming the initial state below, what is the resulting stack state of each of the
   following sequences?
EAX: 12345678H
EBX: 0000000AH
ECX: FF0000FFH
EDX: 00000000H
ESI: 00000008H
EDI: FFFF0000H
EBP: 00000400H
ESP: 00002000H
DS: 2110H
SS: 1000H

   a. PUSH BX
       PUSH AX

   b. PUSH EBX
       PUSH EAX

   c. PUSHA

9. Describe the issues involved in accessing data in assembly, including the two general factors the compiler must account for.

10. How does a program handle statically allocated data (data allocated at compile time)?

11. How does a program handle data that are dynamically allocated when a function is called?

12. Describe the structure of a typical x86 stack frame.