CS 315-01 RISC-V Assembly 5

Functions and recursion

Project 2 due Mon Sep 16 11:59pm
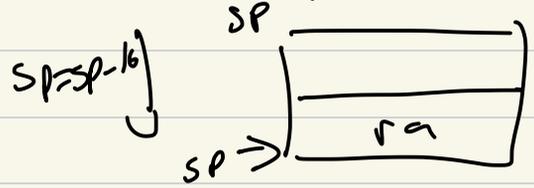
$$sp = sp - 16$$

Function calls

RA

caller-saved regs : a0-a7, t0-t6, ra
callee-saved regs : s0-s11, sp

```
foo:
    addi sp, sp, -16
    sd ra, (sp)
    # save s regs on stack

    '
    # save caller-saved regs
PC → call bar
RA = PC+4    # restore caller-saved regs

    .
    '

    # restore s regs stack
    ld ra, (sp)
    addi sp, sp, 16
    ret
```

```
bar
PC → add a0, a0, a1
    ..
    :
    ·
    |
    |
    |
    |
    |
    |
    |
    |
    '
    \
    ret
```

PC = RA
    (main)
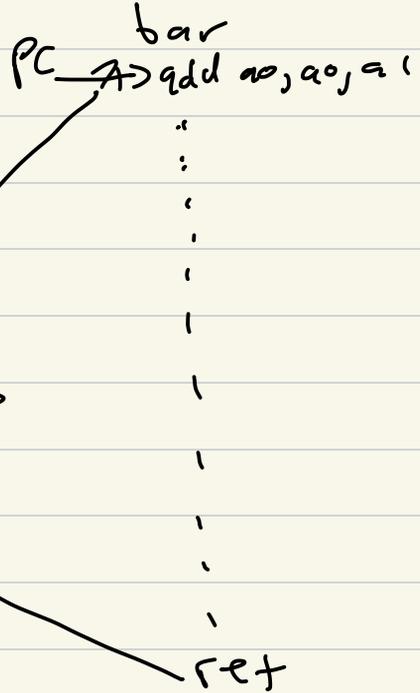
More complicated if/then statement

```
int  is_in_range (int x, int a, int b) {
        if (x >= a && x <= b) {
              return 1;
        } else {
              return 0;
        }
}
```

factrec

factrec-s(3)

factrec-s(2)

factrec-s(1)

fact-rec-s(0)

sp

| 3 |
| ra |
| 2 |
| ra |
| 1 |
| ra |
| X |
| ra |