

Homework 5

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|------------------|-------------------------|---------------|-----|-------------------|---------------|-------------------|--------------------------------------|
| Due | May 5 by 11:59pm | Points | 100 | Submitting | a file upload | File Types | circ, txt, pdf, ys, yo, tgz, and zip |
| Available | after Apr 27 at 11:59pm | | | | | | |

Assembly Language

Submit online via Canvas.

We accept only the following file formats:

- .circ
- .ys, .yo
- .pdf
- .txt
- or zip or tgz of the above

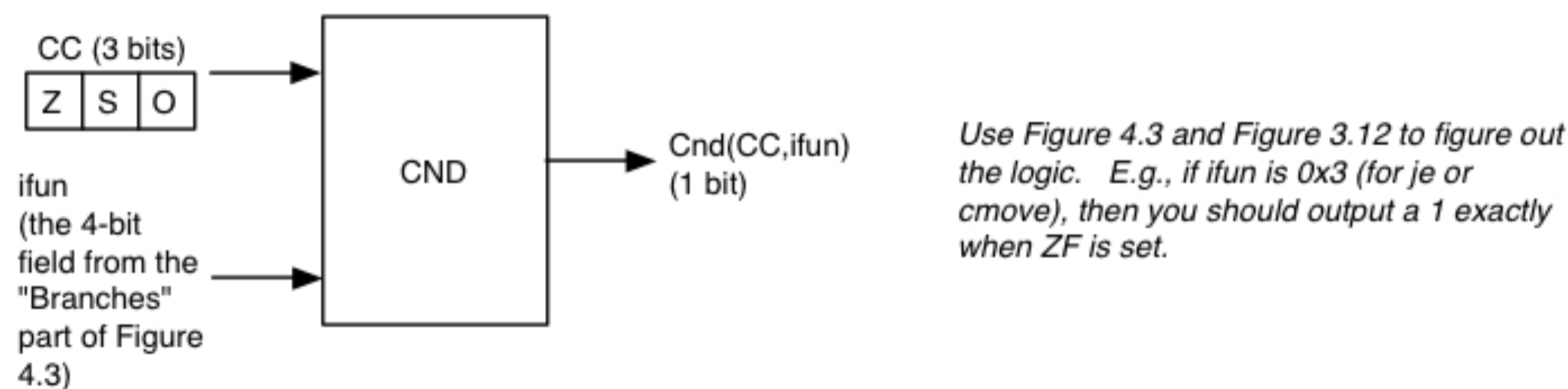
In class this coming week, we'll discuss some guidelines for writing subroutines in assembly. But if you don't want to wait:

- If a subroutine uses a register (e.g., %ebx) as part of its work, then when we return to the caller, whatever the caller might have had there will be gone.
- That may be surprising and annoying.
- Therefore, it's good to adopt the convention of pushing the values of the caller's registers on entry to the subroutine, and popping them out on the way back. The caller can handle this, or the callee handle it---your choice.
- (Also, don't forget to set up a stack)

Q1: Condition Checker (15pts)

In your Y86, you will need a combinatorial circuit that decides, based on the condition codes and the 4-bit ifun field, whether the condition codes satisfy the condition specified in the ifun scenario.

Build a combinatorial circuit that calculates this:



(Remember Fig 4.3 and 3.12 are on our [cheatsheet \(https://ssl.cs.dartmouth.edu/~sws/cs51-s15/y86/cheatsheet.pdf\)](https://ssl.cs.dartmouth.edu/~sws/cs51-s15/y86/cheatsheet.pdf)).

Q2 (20pts)

Practice problem 4.2 from the textbook

Q3 (25pts)

Write an assembler subroutine that takes a binary number in %eax and shifts it left by 4 bits, wrapping around as necessary.

Q4 (35pts)

Write an assembler program that does the same thing as Q1 from HW2.

- Have memory locations (in data) with the targets "input" and "output"
- When the program begins, "input" has the four BCD digits, as two bytes. E.g.

```
input:    # asking about "March 32"
         .byte 0x03
         .byte 0x32
```

- When the program ends, the 4-byte word at "output" contains
 - 0, if the date is does not exist in the 2014 calendar
 - 1, if it does
 - 0xE, if there's an error

You may wish to use Q3 above as subroutine. Or perhaps not.

Q5 (5pts)

Compare and contrast Q4 above with your circuit implementation in HW2.

| Criteria | Ratings | | Pts |
|--|----------------------|-------------------|-------------------|
| Q1. Correctness view longer description | Full Marks 9 pts | No Marks 0 pts | 9 pts |
| Q1. Meaningful appearance | Full Marks 3 pts | No Marks 0 pts | 3 pts |
| Q1. Clarity, neatness, simplicity | Full Marks 3 pts | No Marks 0 pts | 3 pts |
| Q2. view longer description | Full Marks 20 pts | No Marks 0 pts | 20 pts |
| Q3. Correctness view longer description | Full Marks 20 pts | No Marks 0 pts | 20 pts |
| Q3. Elegance, clarity, neatness, etc. | Full Marks 5 pts | No Marks 0 pts | 5 pts |
| Q4. Correctness view longer description | Full Marks 30 pts | No Marks 0 pts | 30 pts |
| Q4. Elegance, clarity, neatness, etc. | Full Marks 5 pts | No Marks 0 pts | 5 pts |
| Q5. Reasonable | Full Marks 5 pts | No Marks 0 pts | 5 pts |
| | | | Total Points: 100 |