CISS360: Computer Systems and Assembly Language
Quiz q0402

Name: aoro1@cougars.ccis.edu Score:

Open `main.tex` and enter answers (look for `answercode`, `answerbox`, `answerlong`). Turn the page for detailed instructions. To rebuild and view pdf, in bash shell execute `make`. To build a gzip-tar file, in bash shell execute `make s` and you'll get `submit.tar.gz`.

Q1. Write a MIPS program that gets integers x and y from the user. If x is 1, the program stores x, y, $2y$ in the data segment (starting at the beginning of course). Otherwise it stores x, y, $3y$ instead.

Test 1
Console:

```
1
2
```

Data segment:

```
        DATA
[0x10000000]...[0x10010000]  0x00000000
[0x10010000]                 0x00000001  0x00000002  0x00000004  0x00000000
[0x10010010]...[0x10040000]  0x00000000
```

Test 2
Console:

```
2
3
```

Data segment:

```
        DATA
[0x10000000]...[0x10010000]  0x00000000
[0x10010000]                 0x00000002  0x00000003  0x00000009  0x00000000
[0x10010010]...[0x10040000]  0x00000000
```

Answer:

```
          .text
          .globl main

main:     la     $s0, result
          li     $v0, 5
          syscall
          move   $t0,$v0          #t0 has x from input
```

```
            sw      $t0, 0($s0)      # store x in first place
            li      $v0, 5
            syscall
            move    $t1,$v0          #t1 has y from input
            sw      $t1, 4($s0)      # store y in second place
            # if-else
            li      $t3, 1
            bne     $t3, $t0, else   # if x != 1 goto else
            add     $t1, $t1, $t1    # t1 = 2y
            sw      $t1, 8($s0)      # store 2y in third place
            j       exit
else:       move    $t2, $t1         # temp store y in t2
            add     $t1, $t1, $t1    # t1 = 2y
            add     $t1, $t1, $t2    # t1 = 3y
            sw      $t1, 8($s0)      # store 3y in third place

exit:       li      $v0, 1
            lw      $a0, 8($s0)      # print result for checking
            syscall
            li      $v0, 10
            syscall

            .data
result:     .word
```

Instructions

In `main.tex` change the email address in

```
\renewcommand\AUTHOR{jdoe5@cougars.ccis.edu}
```

to yours. In the bash shell, execute "`make`" to recompile `main.pdf`. Execute "`make v`" to view `main.pdf`. Execute "`make s`" to create `submit.tar.gz` for submission.

For each question, you'll see boxes for you to fill. You write your answers in `main.tex` file. For small boxes, if you see

```
1 + 1 = \answerbox{}.
```

you do this:

```
1 + 1 = \answerbox{2}.
```

`answerbox` will also appear in "true/false" and "multiple-choice" questions.

For longer answers that needs typewriter font, if you see

```
Write a C++ statement that declares an integer variable name x.
\begin{answercode}
\end{answercode}
```

you do this:

```
Write a C++ statement that declares an integer variable name x.
\begin{answercode}
int x;
\end{answercode}
```

`answercode` will appear in questions asking for code, algorithm, and program output. In this case, indentation and spacing is significant. For program output, I do look at spaces and newlines.

For long answers (not in typewriter font) if you see

```
What is the color of the sky?
\begin{answerlong}
\end{answerlong}
```

you can write

```
What is the color of the sky?
\begin{answerlong}
The color of the sky is blue.
\end{answerlong}
```

For students beyond 245: You can put LaTeX commands in `answerbox` and `answerlong`.

A question that begins with "T or F or M" requires you to identify whether it is true or false, or meaningless. "Meaningless" means something's wrong with the statement and it is not well-defined. Something like "$1+_2$" or "$\{2\}^{\{3\}}$" is not well-defined. Therefore a question such as "Is $42 = 1+_2$ true or false?" or "Is $42 = \{2\}^{\{3\}}$ true or false?" does not make sense. "Is $P(42) = \{42\}$ true or false?" is meaningless because $P(X)$ is only defined if X is a set. For "Is $1 + 2 + 3$ true or false?", "$1 + 2 + 3$" is well–defined but as a "numerical expression", not as a "proposition", i.e., it cannot be true or false. Therefore "Is $1 + 2 + 3$ true or false?" is also not a well-defined question.

When writing results of computations, make sure it's simplified. For instance write 2 instead of $1 + 1$. When you write down sets, if the answer is $\{1\}$, I do not want to see $\{1, 1\}$.

When writing a counterexample, always write the simplest.

Here are some examples (see `instructions.tex` for details):

1. T or F or M: $1 + 1 = 2$ ..... T
2. T or F or M: $1 + 1 = 3$ ..... F
3. T or F or M: $1+^2 =$ ..... M
4. $1 + 2 =$ 3
5. Write a C++ statement to declare an integer variable named `x`.

   ```
   int x;
   ```

6. Solve $x^2 - 1 = 0$.

   Since $x^2 - 1 = (x - 1)(x + 1)$, $x^2 - 1 = 0$ implies $(x - 1)(x + 1) = 0$. Therefore $x - 1 = 0$ or $x = -1$. Hence $x = 1$ or $x = -1$.

7. Which is true? C
   (A) $1 + 1 = 0$
   (B) $1 + 1 = 1$
   (C) $1 + 1 = 2$
   (D) $1 + 1 = 3$
   (E) $1 + 1 = 4$