

**CISS360: Computer Systems and Assembly Language
Quiz q0203**Name: aoro1@cougars.ccis.eduScore:

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`.

In each of the following questions, you must write a complete program that can run in PCSPIM. If your code does not run properly in my PCSPIM (hangs or crashes or run in an infinite loop) or the output is incorrect, you will get a 0 for a test case.

For input and output, use `$a0`, `$v0`.

For computations use `$a0`, `$v0`, and the t-registers beginning with `$t0`. Make your code as efficient as possible. This means use the least number of instructions/pseudoinstructions/syscalls and the least number of t-registers.

Q1. Write a PCSPIM program that reads three integers x , y , and z from the keyboard and prints the value

$$x + y - z$$

in the console window.

ANSWER:

```
.text
.globl main
main:  li    $v0, 5          # read int x and store it in $a0
       syscall
       move  $a0, $v0

       li    $v0, 5          # read int y and store it in $t0
       syscall
       move  $t0, $v0

       li    $v0, 5          # read int z and store it in $v0
       syscall

       add   $a0, $a0, $t0    # a0 = a0 + t0 = x + y
       sub   $v0, $a0, $v0    # v0 = a0 - v0 = x + y - z
       li    $v0, 1
```

```

    syscall

    li      $v0, 10
    syscall

```

Number of instructions/pseudoinstructions/syscalls .. 5 Number of t-registers used 1

Q2. Write a PCSPIM program that reads three integers x , y , and z from the keyboard and prints the value

$$x + y - 4z$$

in the console window.

ANSWER:

```

    .text
    .globl main
main:
    li      $v0, 5
    syscall
    move    $a0, $v0

    li      $v0, 5
    syscall
    move    $t0, $v0

    li      $v0, 5
    syscall

    add     $a0, $a0, $t0
    addi    $a0, $a0, -4
    move    $t0, $v0
    li      $v0, 1
    syscall

    li      $v0, 4
    la      $a0, TAB
    syscall

    li      $v0, 1
    move    $a0, $t0
    syscall

    li      $v0, 10
    syscall

    .data

```

| |
|-----------------------------|
| TAB: .asciiz "\t" |
|-----------------------------|

Number of instructions/pseudoinstructions/syscalls .. Number of t-registers used

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) $1 + 1 = 4$