CISS360: Computer Systems and Assembly Language
Quiz q0502

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 gets a string x from the user (assume a maximum length of 100), store the string in the data segment, get an integer i from the user, and print the ASCII code (an integer value) of the i-th character of x. (Note: The index starts with 0. So if i is 1, I mean the second character of x.)

Answer:

```
        .text
        .globl main

main:
        # get input string from the user
        li    $v0, 8
        la    $a0, input_string
        li    $a1, 100  # maximum length of the string
        syscall

        # get integer i from the user
        li    $v0, 5
        syscall
        move  $t0, $v0  # i is in t0

        # calculate the address of the i-th character in the string
        la    $t1, input_string
        add   $t1, $t1, $t0  # add i to the base address

        # load the ASCII value of the i-th character
        lb    $t2, 0($t1)    # load a character from input_string at address t1

        # print the ASCII value of the i-th character
        move  $a0, $t2       # load the ASCII value into a0
        li    $v0, 1
        syscall

        li    $v0, 10
        syscall
```

```
        .data
input_string: .space 100
```

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: $1 + 1 = 2$ .... $\boxed{\text{T}}$
2. T or F or M: $1 + 1 = 3$ .... $\boxed{\text{F}}$
3. T or F or M: $1+^2 =$ .... $\boxed{\text{M}}$
4. $1 + 2 = \boxed{3}$
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? .... $\boxed{\text{C}}$
   (A) $1 + 1 = 0$
   (B) $1 + 1 = 1$
   (C) $1 + 1 = 2$
   (D) $1 + 1 = 3$
   (E) $1 + 1 = 4$