

CISS245: Advanced Programming Quiz q04

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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. Either write down the output of this code fragment or write ERROR if it is not valid C++.

```
int x = 0, y = 42, z = 99;
if (x < 0)
{
    int y = 1, z = 100;
    if (x == 0)
    {
        int y = 2;
        if (y < 1)
        {
            std::cout << z;
        }
        else
        {
            std::cout << z;
        }
    }
    else
    {
        int y = 3;
        if (y < 2)
        {
            std::cout << z;
        }
        else
        {
            std::cout << z;
        }
    }
}
else
{
    int y = 4, z = 200;
    if (x == 0)
    {
        if (y < 3)
        {
            std::cout << z;
        }
        else
        {
            std::cout << z;
        }
    }
}
```

```
else
{
    if (y < 4)
    {
        std::cout << z;
    }
    else
    {
        std::cout << z;
    }
}
```

ANSWER:

Q2. Rewrite the following function so that the if-else statement is replaced by the ternary operator. The function should contain only one statement.

```
int sign(double x)
{
    int ret;
    if (x >= 0)
    {
        ret = 1;
    }
    else
    {
        ret = -1;
    }
    return ret;
}
```

ANSWER:

Q3. Write a function

```
int numdigits(int n);
```

that returns the number of digits in **n**. For instance if **n** is 0 or 5 or 9, the function returns 1. If **n** is 23 or 42 or 99, the function returns 2. If **n** is -123 or -243 or -798, the function returns 3. Etc.

ANSWER:

Q4. Write a function

```
bool isprime(int n);
```

that returns `true` if and only if `n` is a prime. For instance if `n` is 2, 3, 5, 7, 11, 13, 17, 19, 23, or 29, the function returns `true`. If `n` is 0, 1, 4, 6, 8, 9, 10, 12, 14, or 15, the function returns `false`.

ANSWER:

INSTRUCTIONS

In `main.tex` change the email address in

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

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 L^AT_EX commands in `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) $1 + 1 = 4$