CISS245: Advanced Programming
Quiz q2201

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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. What is the output of the following program:

```
#include <iostream>

void change(int x[], int x_len, index, value)
{
    x[index] = value;
}

int main()
{
    int x[1000] = {2, 3, 5};
    int x_len = 3;
    change(x, xlen, 2, 7);
    std::cout << x[2];
    return 0;
}
```

Answer:

Q2. The purpose of `push_back` is to "extend" the array:

```
#include <iostream>

void push_back(int x[], int x_len, value)
{
    x[x_len] = value;
    ++x_len;
}

int main()
{
    int x[1000] = {2, 3, 5};
    int x_len = 3;
    push_back(x, x_len, 7);

    std::cout << x_len           // should be 4
              << ' '
              << x[3] << '\n';   // should be 7
    return 0;
}
```

But the function does not work. Correct the function if necessary
Answer:

```
#include <iostream>

void push_back(int x[], int x_len, value)
{
    x[x_len] = value;
    ++x_len;
}

int main()
{
    int x[1000] = {2, 3, 5};
    int x_len = 3;
    push_back(x, x_len, 7);

    std::cout << x_len           // should be 4
              << ' '
              << x[3] << '\n';   // should be 7
    return 0;
}
```

Q3. Correct the following function if necsssary.
Answer:

```
#include <iostream>

void f(int x)
{
    ++x;
```

```
}

void g(const int & x)
{
    ++x;
}

int main()
{
    int a = 0;
    f(a);      // on return, a should be 1
    g(a);      // on return, a should be 2
    return 0;
}
```

Q4. Write down the output or write ERROR if there's an error in the code fragment.

```
int a = 0;
int b = 1;
int & c = a;
int & d = b;
const int & e = d;
a = 2;
c = 3;
d = 4;
std::cout << a + b + c + d + e;
```

Answer:

Q5. Write down the output or write ERROR if there's an error in the code fragment.

```
int a = 0;
int b = 1;
int & c = a;
int & d = b;
const int & e = d;
a = 2;
d = 3;
e = 4;
std::cout << a + b + c + d + e;
```

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 LaTeX 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) $1 + 1 = 4$