

**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 necessary.

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:

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## INSTRUCTIONS

In `main.tex` change the email address in

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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)  $1 + 1 = 4$