CISS245: Advanced Programming
Quiz q06

Name: YOUR EMAIL Score:

Q1. Write function
`void merge(int x[], int & x_len , int y[], int y_len, int z[], int z_len)`
where `y[0]`, `y[1]`, ... `y[y_len - 1]` and `z[0]`, `z[1]`, ... `z[z_len - 1]` are both sorted and the values in array `y` and `z` are "merged" into `x` so that `x` is sorted and `x_len` is set to `y_len + z_len`. For instance if `y` is `{0, 2, 6}` (and `y_len` is 3) and `z` is `{0, 1, 2, 5, 7, 9}` (and `z_len` is 5), then `x` becomes `{0, 0, 1, 2, 2, 5, 6, 7}` and `x_len` is 8. Iteratively, the least among what is left in `y` and `z` is selected to be placed in `x`.

```
y = {0, 2, 6}, z = {0, 1, 2, 5, 7, 9}, x = {0, ?, ?, ?, ?, ?, ?, ?, ?}
y = {0, 2, 6}, z = {0, 1, 2, 5, 7, 9}, x = {0, 0, ?, ?, ?, ?, ?, ?, ?}
y = {0, 2, 6}, z = {0, 1, 2, 5, 7, 9}, x = {0, 0, 1, ?, ?, ?, ?, ?, ?}
y = {0, 2, 6}, z = {0, 1, 2, 5, 7, 9}, x = {0, 0, 1, 2, ?, ?, ?, ?, ?}
y = {0, 2, 6}, z = {0, 1, 2, 5, 7, 9}, x = {0, 0, 1, 2, 2, ?, ?, ?, ?}
y = {0, 2, 6}, z = {0, 1, 2, 5, 7, 9}, x = {0, 0, 1, 2, 2, 5, ?, ?, ?}
y = {0, 2, 6}, z = {0, 1, 2, 5, 7, 9}, x = {0, 0, 1, 2, 2, 5, 6, ?, ?}
y = {0, 2, 6}, z = {0, 1, 2, 5, 7, 9}, x = {0, 0, 1, 2, 2, 5, 6, 7, ?}
y = {0, 2, 6}, z = {0, 1, 2, 5, 7, 9}, x = {0, 0, 1, 2, 2, 5, 6, 7, 9}
```

Note: there must be no sorting done on `x`.
Answer:

```
void merge(int x[], int & x_len , int y[], int y_len, int z[], int z_len)
{
}
```

(Hint on next page if needed.)

Hint

Use 3 index variables, one for each array. Here's a pseudocode for you:

```
i = 0 // index for x
j = 0 // index for y
k = 0 // index for z

while j < y_len and k < z_len:
    compare y[j] and z[k]
    put the smaller of the two into x[i] and increment i
    increment j if y[j] was used, otherwise increment k

while j < y_len:
    copy y[j] to x[i] and increment i and j

while k < z_len:
    copy z[k] to x[i] and increment i and k

set x_len appropriately (using i)
```

Instructions

In the file `thispreamble.tex` look for

```
\renewcommand\AUTHOR{}
```

and enter your email address:

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

(This is not really necessary since alex will change that for you when you execute `make`.) In your bash shell, execute "`make`" to recompile `main.pdf`. Execute "`make v`" to view `main.pdf`.

Enter your answers in `main.tex`. In the bash shell, execute "`make`" to recompile `main.pdf`. Execute "`make v`" to view `main.pdf`.

For each question, you'll see boxes for you to fill. 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 need 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}
```

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 question and it is not well-defined. Something like "$1 + 2 = 4$" is either true or false (of course it's false). Something like "$1+_2 = 4$?" does not make sense.

When writing results of computations, make sure it's simplified. For instance write 2 instead of $1 + 1$.

Higher level classes.

For students beyond 245: You can put LaTeX commands in `answerlong`.

More examples of meaningless statements: Questions 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.

More examples of simplification: When you write down sets, if the answer is $\{1\}$, do not write $\{1, 1\}$. And when the values can be ordered, write the elements of the set in ascending order. When writing polynomials, begin with the highest degree term.

When writing a counterexample, always write the simplest.