CISS245: Advanced Programming
Quiz q6401

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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. In the Wumpus world, suppose you have several Wumpuses. When a hunter kills a Wumpus, say `joe_wumpus`, the hunter earns `joe_wumpus.points_`. You think it's reasonable for `joe_wumpus.points_` to be 1000. When the hunter kills any Wumpus, the number of points awarded is the same. Of course each Wumpus has a row and a column for its position in the Wumpus World. Each Wumpus also has a direction (N, S, E, W) which is the direction that it is facing, i.e., if the Wumpus is facing N, then when it moves it will move in the north direction if it does not bump against a wall.

Correct the following header file to optimize on memory usage when you have a huge number of Wumpuses.
Answer:

```
// file: Wumpus.h
class Wumpus
{
public:
    Wumpus();
    int get_points();
    // other methods not shown
private:
    bool is_alive_;
    int row_;
    int col_;
    char direction_;
    int points_;
};
```

Q2. Refer to the question above. Complete the following by implementing `Wumpus::Wumpus()`, `Wumpus::get_points()`, and whatever is necessary. You need not implement methods not shown in the previous question. (There is something else besides the above two functions.)
Answer:

```
// file: Wumpus.cpp
#include "Wumpus.h"

```

Q3. The `DollarAmount` class behaves like this:

```
DollarAmount amt0(1);
DollarAmount amt1(1234);
std::cout << amt0 << '\n'; // prints "$0.01" (without double-quotes)
std::cout << amt1 << '\n'; // prints "$12.34" (without double-quotes)
DollarAmount::set_format(1);
std::cout << amt0 << '\n'; // prints "1c" (without double-quotes)
std::cout << amt1 << '\n'; // prints "1234c" (without double-quotes)
DollarAmount::set_format(0);
std::cout << amt0 << '\n'; // prints "$0.01" (without double-quotes)
std::cout << amt1 << '\n'; // prints "$12.34" (without double-quotes)
```

Complete and correct `DollarAmount.h` so that the above code fragment works. Do not define the bodies of the methods (do that in the next question).
Answer:

```
// file: DollarAmount.h

#ifndef DOLLARAMOUNT_H
#define DOLLARAMOUNT_H

#include <iostream>

class DollarAmount
{
public:
private:
    int cents_;
    int format_;
};

       operator<<(      );
```

Q4. Refer to the previous question. Complete `DollarAmount.cpp` so that the code fragment in the previous question works.
Answer:

```
// file: DollarAmount.cpp

#include <iostream>
#include "DollarAmount.h"

```

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: $1 + 1 = 2$ ..... 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) $1 + 1 = 4$