CMPT 414 / MSCS 565
Game Programming I
Quiz #1
Exam, Form: $\boxed{\text{A}}$

Name: _____

Date: _____

Section 1. C++ Build Procedure and Configuration

1. Draw a diagram illustrating the build procedure for C++ programs. Be sure to include all three fundamental steps, in the correct order, that take us from source code to executable binary. **(Weight=7)**

   Note: Do <u>not</u> include in your diagram the *execution* the program as a process,but be sure to show what files go in/out of each step.

2. Consider the sample error messages listed below. For each one, cite the step of the build procedure at which the error is likely to occur, and then indicate which configuration property in the IDE must be configured to fix the issue. **(Weight=4)**

   (a) `LNK1104 cannot open file 'sfml-graphics-d.lib'`

   (b) `E1696 cannot open source file "SFML/Graphics.hpp"`

   (c) `LNK2019 unresolved external symbol "__declspec(dllimport) public: __thiscall sf::Font::Font(void)" (__imp_??0Font@sf@@QAE@XZ) referenced in function _main`

   (d) `E0020 identifier "VideoMode" is undefined`

3. Which *environment variable* can we configure to help ensure that our SFML-based program can find the necessary dynamic libraries at run time? **(Weight=1)**

Section 2. C++ Program Syntax and Correctness

```
1    #include <SFML/Graphics.hpp>
2
3    int main()
4    {
5        setup();      // identifier "setup" not found
6
7        VideoMode vm(640, 480);    // identifier "RenderWindow" is undefined
8        RenderWindow window(vm, "Game title");
:        // imagine the rest of the game code here...
79     return 0;
80   }
81
82   void setup()
83   {
:        // imagine some global initialization stuff here...
96   }
```

4. Compiling the code above results in the errors shown in the comments. *Assume the project build properties are <u>correct</u>.* For each error cited below, identify the cause and explain how to fix it. (**Weight=2**)

   (a) Error on Line 5

   (b) Error on Line 7

5. Suppose we're making a card game such as *Hearts* or *Poker*. Write some C++ code to declare an **enumeration class** that we could use to represent the four <u>suits</u> of typical a deck of cards. (**Weight=1**)

6. Show how to declare a C++ array that can hold ten double-precision floating-point values. (**Weight=2**)

   How much memory space does this array take up (in bytes)?

Section 3. Design Patterns for Games

7. **(Weight=3)** Draw a simple flowchart illustrating the basic *Game Loop* design pattern. <u>Note:</u> Do <u>not</u> worry about accounting for time/variable frame rates. **(Weight=3)**

8. There are two basic ways to account for time in our game loop so that we ensure a consistent experience for players, regardless of the underlying hardware. Choose <u>one</u> of these ways and then... **(Weight=2)**

   (a) Add to your diagram above to show where in the loop you would account for time.

   (b) Explain the circumstances to which your chosen approach is best suited. That is, when is that method appropriate instead of the other method?

9. Consider the *Double Buffer* pattern as it applies to *rendering*. **(Weight=3)**

   (a) What problem does this Double-Buffering solve? Be as detailed as possible.

   (b) What are the roles of the **front** and **back** buffer in this pattern, as it relates to rendering? You may, but are not required to, draw a diagram to help answer this part.

10. Finally, what design pattern is likely used behind the scenes by SFML, as shown in the code below that uses a loop to process input. For maximum credit, explain something about why this pattern is needed. **(Weight=2)**

```
Event event;
while (window.pollEvent(event)) {
    if (event.type == Event::KeyReleased && !paused) {
    }
    // handle other kinds of events here...
}
```