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|  | **ISCG6442—Game Programming**  **Assignment 3: Take Home Test**  *Total marks: 100*  *Course Weighting: 20%*  *Due Date: End of semester* |

**Instructions:**

This is a take-home open book test. You may complete the test at your own pace as long as you upload your answers on Moodle by the due date. You are allowed to use online sources and previous course exercises as references. Please submit a ZIP file that contains a Visual Studio project answering each question for section 2-4 and a text file or word document for section 1 and 5.

# Section 1—C++ [20 Marks]

1. C++ is an Object Oriented Programming language. Give a short explanation of what OOP is and at least one benefit of OOP in game programming.

[2 Marks]

1. Give short explanations for:
   1. Class
   2. Object
   3. Inheritance
   4. Polymorphism
   5. Abstraction
   6. Encapsulation

[6 Marks]

1. Explain the difference(s) between class and header files in C++.

[2 Marks]

1. Give a brief explanation of the model, view and controller in MVC architecture for game development.

[3 Marks]

1. Design a possible class diagram for a simple platformer game. The game has a playable character that can move left, right, jump and crouch. The in-game objects include platforms that the player can walk on, coins and enemies. The enemies are placed randomly on platforms in the game world and can only move within the platform. Your diagram should include possible data members and member functions.

[7 Marks]

# Section 2— SFML & Game Physics [30 Marks]

1. Write an SFML program to draw a 32 x 32 grid of cells using the SFML line primitives.

[5 Marks]

1. Write an SFML program that generates 5 blue colored round particles each moving towards random directions with random starting points. Use a vector to keep track of your particles. Create collision detection between the particles and the walls. The particles should bounce and change colour when they collide with the walls.

[15 Marks]

1. Develop a particle emitter that emits a stream of particles moving outwards from the centre of the screen. Use vector or an array of a linked list to keep track of all the different particles in the system.

[5 Marks]

1. Using answer number 8, add a gravitational force to the particles on screen to pull them to the bottom of the screen.

[2.5 Marks]

1. Using answer number 8, modify the particles so that they gradually disappear from the screen after a certain amount of iteration. (Hint: Add a life variable to keep track of the alpha channel, then completely remove the particles after their life reaches 0.)

[2.5 Marks]

# Section 3—Game Artificial Intelligence [10 Marks]

1. Develop an example of the Chase AI. Use simple placeholder graphics (different coloured rectangles or circles) to represent the enemy and player objects on screen. The player character will need to respond to right arrow, left arrow, up arrow, and down arrow keyboard input. The computer controlled AI will need to move at a set speed and follow the human player.

[10 Marks]

# Section 4 – Game Sprites [20 Marks]

1. Develop a Sprite class or structure to allow a character to move around a game world. Use different animation frames for the up, down, left and right directions. Add user control to your game sprite and allow a human character to control the position of the sprite inside the game world. You may use the provided sprite sheet or use your own.

[15 Marks]

1. Add an obstacle to your game world (i.e. a simple rectangle). Modify the Sprite class to allow the Sprite to walk around the obstacle. Your sprite should not be able to walk through the obstacle.

[5 Marks]

# Section 5—Problem Solving Capability [20 Marks]

1. Write approximately 500 words, describe the major game development problems you have overcome in your 2D sprite project. Please describe your solutions to these problems.

[20 Marks]

**Submission Details:**

* This is an individual assignment.
* You must work on the individual tasks by yourself and all work on these tasks must be your own.
* Your final submission should include a Visual Studio project answering each question for section 2-4 and a text file or word document for section 1 and 5.
* When submitting the work via the Moodle as part of your assessment submission you agree that the work is your work and your work alone.

**Assignment hand-in**:

Assignments submitted after the due date and time without having received an extension through Special Assessment Circumstances (SAC) will be penalised according to the following:

* 10% of marks deducted if submitted within 24hrs of the deadline
* 20% of marks deducted if submitted after 24hrs and up to 48hrs of the deadline
* 30% of marks deducted if submitted after 48hrs and up to 72hrs of the deadline
* No grade will be awarded for an assignment that is submitted later than 72hrs after the deadline.
* Students submitting assignments after the due date and time will be ineligible to resubmit a failed assignment.

**Special Assessment Circumstances:**

A student, who due to circumstances beyond his or her control, misses a test, final examination or an assignment deadline or considers his or her performance in a test, final examination or an assignment to have been adversely affected, should complete the Special Assessment Circumstances (SAC) form available from Student Central.

Within any semester, a student may have only one SAC per course.

When requesting an SAC for an assignment, the SAC form must be submitted (along with work completed to date) within the time frame of the extension requested; i.e. if the Doctor’s certificate is for one (1) day, then the SAC form and work completed must be submitted within one (1) day.

**Unacceptable Assistance**

* Working together on one copy of the assessment and submitting it as own work.
* Giving another student your work.
* Copying someone else’s work. This includes work done by someone not on the course.
* Copying from books, Internet etc. and submitting it as own work. Anything taken directly from another source must be acknowledged correctly: show the source alongside the quotation.
* Changing or correcting another student’s work.

**Have a query? Want to improve your work?**

You could:

* Talk it over with your lecturer, course coordinator, and programme leader.
* Visit Te Puno Ako or Maia for learning advice and support.
* Visit the Centre for Pacific Development and Support.
* Contact Ed Collective Advocate for independent advice.

This is an individual assignment. You must work on the individual tasks by yourself and all work on these tasks must be your own.

Please sign the statement below to declare that this assignment submission is your own work and hand in the signed statement with your assignment. Failure to sign and include this statement may mean your assignment is not marked.

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| **ISCG6442—Game Programming**  Take Home Test  I declare that the individual part of this assignment submission is my own work. Where I have incorporated work by other people, I have correctly acknowledged the source in my assignment.  Student Name …………………………………….. Student ID …………………..…  Date: ……….….……. |