

Title: Math for Games

Assessment Details: (please refer to your Class Schedule for actual date)

Start Date: Week 13

Submission Milestone: First day of Week 19

Assessment Milestone: Second and Third day of Week 19

Assessable units of competency

[ICAPRG416A](#) – Manage a software component reuse library

[ICAPRG527A](#) – Apply intermediate object-oriented language skills

PGDMTH601A – Apply fundamental games programming mathematical skills

General description

Part 1

You are to first create a Math Library as either a Static (LIB) or Dynamic Library (DLL) using the C++ programming language.

This math library must implement the following objects using floating-point data in row-major right-handed form:

- 2-D Vector (2x1)
- 3-D Vector (3x1)
- 4-D Vector (4x1)
- 2-D Matrix (2x2)
- 3-D Matrix (3x3)
- 4-D Matrix (4x4)

Your library must include the following abilities, where **V** is a vector, **M** is a matrix and **f** is a float:

- $V = V + V$
- $V = V - V$
- $V = V \times f$
- $V = f \times V$
- $V = M \times V$
- $M = M \times M$
- $f = \text{dot}(V, V)$
- $V = \text{cross}(V, V)$ where V is a 3-D or 4-D vector
- $f = \text{magnitude}(V)$
- $V = \text{normalised}(V)$

Your matrix objects should support being set up as rotation matrices, scale matrices and translation matrices.

Your vectors and matrices should also have the ability to return or cast to an array of float.

Part 2

You are to create a simple graphical game application that uses your Math Library created in Part 1 to transform the game objects. The library must be linked to the project.

It is recommended that you create a 2-D game due to art requirements and time constraints.

Your game must demonstrate the following requirements:

- Game entities that use a matrix to store their position, scale and rotation.
 - These objects should have the ability to set positions, rotations and scales
 - The matrix should be used to transform the art assets, such as sprite coordinates, when drawing.
- Example of at least 1 matrix hierarchy
 - For example, a turret attached to a tank that can rotate independently from the tank body, but that moves with the tank, and is offset from the tank's body.
- Example of projectiles that move on their own accord over time.
- Example of game entity/s controlled by a player.
- Examples of collision detection and response.

Your teacher will advise a suitable graphical API to use for your game project.

It is recommended that you recreate an existing game, such as Tiny Tanks (<http://www.multiplayer.gg/>), Bomberman (<http://en.wikipedia.org/wiki/Bomberman>) or 1942 (http://en.wikipedia.org/wiki/1942_%28video_game%29).

These are just suggestions.

The art for the game is not being assessed.

Knowledge and skills

Listed here is the knowledge and skills you'll be learning and on which you will be assessed.

- Creating reuse libraries
- Use of Vectors
- Use of Matrices
- Creating a graphical game
- Using reuse libraries
- Using mathematics within a game



Evidence specifications

This is the specific evidence you must prepare for and present on assessment day to demonstrate you have competency in the above knowledge and skills. The evidence must conform to all the specific requirements listed below.

1. Maths Library

2. Graphical Game

Your roles and responsibilities as a candidate

- Understand and feel comfortable with the assessment process
- Know what evidence you must provide during your assessment
- Take an active part in the assessment process
- Be ready for the assessment at the nominated time

Assessment rubric

This table defines exactly what is required to be successfully deemed competent.

Evidence	Definition of Competent for Math for Games
1. Math Library	<p>Competence in the Math Library task is defined as</p> <ul style="list-style-type: none"> • Math Library, either as a Static Library (LIB) or Dynamic Link Library (DLL) that supports: <ul style="list-style-type: none"> • 2-D Vector (2x1) • 3-D Vector (3x1) • 4-D Vector (4x1) • 2-D Matrix (2x2) • 3-D Matrix (3x3) • 4-D Matrix (4x4) • Math objects support all of the features listed in Part 1 of the General Description • Library submitted in two forms: <ul style="list-style-type: none"> • Source folder, containing all .h/.c/.cpp files and solution/project files needed for building the library • Redistributable Binary folder that contains .h/.lin/.dll needed for using the library
2. Graphical Game	<p>Competence in the Graphical Game task is defined as</p> <ul style="list-style-type: none"> • Submission of a game application, including any necessary assets, that uses the Math Library to transform entities around the game world • The game must meet each of the requirements listed in Part 2 of the General Description • Application submitted in two forms: <ul style="list-style-type: none"> • Source folder, containing all .h/.c/.cpp and solution/project files needed for building the application • Binary Release that contains the application executable and all assets required to run the application



Assessment instructions for candidate

METHOD OF ASSESSMENT

Assessment is a cumulative process which takes place throughout a subject. A 'competent' or 'not yet competent' decision is conducted at the end of a subject through an interview. The interview will be conducted by you personally presenting evidence that demonstrates your competence in a short interview with your assessor. The evidence you must prepare and present is described above in this assessment criteria document. Assessments will be conducted at a specific milestone recorded above in this assessment criteria document.

ASSESSMENT CONDITIONS

Formative assessment takes place as your teacher observes the development of your work throughout the subject and, although the assessor is likely to be aware of the evidence you are submitting, it is your responsibility to be prepared for the interview where a competency judgement is made. If you have forgotten something or made a small mistake at the time of the milestone assessment you may correct it, however the assessor may choose to assess other candidates who are better prepared and return to you if time permits. Upon completion of the assessment you will be issued with feedback and a record of the summative assessment, which you will need to acknowledge that you have accepted the result. If you are absent on the nominated assessment day (without prior agreement or a sufficient documented excuse) you will be assessed as not yet competent.

GRADING

The assessment you are undertaking will be graded as either *competent* or *not yet competent*.

REASSESSMENT PROCESS

If you are assessed as being not yet competent you will receive clear, written and oral feedback on what you will need to do to achieve competence. You will be given a reassessment milestone no more than one (1) week later to prepare your evidence. If you are unsuccessful after your reassessment you will be required to attend an intervention meeting with your Head of School to discuss your progress and any support you may need.

REASONABLE ADJUSTMENTS

We recognise the need to make reasonable adjustments within our assessment and learning environments to meet your individual needs. If you need to speak confidentially to someone about your individual needs please contact your teacher.

