

CMSI 371-01

COMPUTER GRAPHICS

Spring 2013

Assignment 0326

This assignment represents the next building block in your 3D graphics arsenal—a solid matrix library. It has a short turnaround because it is fairly plug-and-chug, plus the semester’s schedule makes it ideal to have this done before the Easter break.

Outcomes

This assignment will affect your proficiency measures for outcomes *2a*, *2b*, *3d*, *3e*, and *4a–4f*.

Not for Submission

If you have access to the Angel textbook, read Sections 3.1–3.12 (pages 116–180) for additional depth and detail.

For Submission

You will want to base this assignment on the *vector* bazaar sample. Structure your repository and write source code so that your *pipeline* scene uses your matrix code without needing redundant copies.

Enter the Matrix

Design and implement a computer graphics matrix library, *matrix4x4.js*. Include:

- A basic `Matrix4x4` object that initializes, by default, to the identity matrix
- A `multiply` function which multiplies two `Matrix4x4` objects and returns the result (as a `Matrix4x4` object, of course)
- A `translate` function which takes three parameters `dx`, `dy`, and `dz`, returning a `Matrix4x4` object that accurately represents this transformation
- A `scale` function which takes three parameters `sx`, `sy`, and `sz`, returning a `Matrix4x4` object that accurately represents this transformation
- The `rotate` function given in the sample code, but refactored to fit your `Matrix4x4` object
- The `ortho` projection function given in the sample code, but, as with `rotate`, refactored to fit your `Matrix4x4` object
- A `frustum` projection function based on the matrix derived from the course handout
- Conversion/convenience functions to prepare the matrix data for direct consumption by WebGL and GLSL

Demonstrate your library’s correctness with a unit test suite based on QUnit (as demonstrated by the *vector* example). If you like, you may also start using the library in your fledgling scene.

Commit and push your work to your git repository, *under a location of your choosing* but set up as described in the top paragraph.