

ICS 62 – Game Technologies and Interactive Media – Spring, 2015 – Test #1

Your name in block letters: _____

1. (20 points) A quotation from the article *Video Games and The Future of Learning*:

We argue that, to understand the future of learning, we should be looking beyond schools to the emerging area of video games.

Consider the goal, for a high school course, of creating a game to help students learn the structure and operation of the United States government, or some section of the U.S. government. If you are not familiar with U. S. government, you can choose a different government. Propose a game design inspired by the article. Concisely describe your proposed game, carefully showing how specific aspects of the design and the game mechanics fulfill specific criteria that the article's authors think are important.

2. (20 points) In your sketches, use a coordinate system where the positive X axis points to the right, the positive Y axis points up, and the positive Z axis points towards your eye. This is referred to as a “right hand coordinate system” – think of your thumb as the X positive axis, your index finger as the positive Y axis, and your middle finger as the positive Z axis.

Draw your sketches on the next sheet, and make sure they are clearly labeled “p”, “q”, “r”, etc.

Consider two 3D models, each a triangle mesh. To keep things simple, each mesh consists of a single triangle. Model A has vertices $V1=(-1, 0, 0)$, $V2=(3, 0, 0)$, and $V3=(1, 1, 0)$. Model B has vertices $V4=(-1, 1, 1)$, $V5=(0, 2, 1)$, and $V6=(1, -1, 0)$.

- p. Draw Model A, showing the X , Y , and Z axes and labeling the vertices.
- q. Draw Model B, showing the X , Y , and Z axes and labeling the vertices.

The level designer wants Model A and Model B in the new level, both in the vicinity of $x=-2$, $y=0$, $z=-3$, with their lowest points at $y=0$. The exact x and z positioning isn't important (or isn't known at this time), but the two models shouldn't intersect. Model A should be stretched to be twice as “wide” in the x dimension (no change to its extent in y and z), and Model B should be rotated by 180 degrees around the z axis.

- r. Sketch the level, showing both Model A and Model B, showing the x , y , and z axes, and labeling the vertices.
- s. For Model A's three vertices, write the transformations you applied to change from “model space” to “scene space” and list the new vertex coordinates.
- t. For Model B's three vertices, write the transformations you applied to change from “model space” to “scene space” and list the new vertex coordinates.

Let's place the camera at $(0, 0, 3)$ looking down the negative z axis. Recall the concept of a view frustum.

- u. Draw a picture of the scene (Model A and Model B) inside of a view frustum.

3. (10 points) Here is the Unity3D CameraController script from Roll-a-ball:

```
using UnityEngine;
using System.Collections;

public class CameraController : MonoBehaviour {

    public GameObject player;
    private Vector3 offset;

    void Start () {
        offset = transform.position;
    }

    void LateUpdate () {
        transform.position = player.transform.position + offset;
    }
}
```

How would the game look and play differently if “LateUpdate” is changed to “Update”?
Explain why.

How would the game look and play differently if “LateUpdate” is changed to “FixedUpdate”?
Explain why.

How would the game look and play differently if “Start” is changed to “Update”? Explain why.