Practice quiz 1

This practice quiz is intended to help you study for the real quiz. However, it varies from the real quiz in a number of ways:

- It's much longer
- It has a number of essay questions, which take too much time for an in-class quiz. So the real quiz will focus more on having you write small amounts of code as well as showing you code and asking you questions about it, e.g. how does it work, or why does it do this broken thing and how do you fix it.
- The real quiz will include a glossary of Unity stuff so you won't have to memorize methods or fields.

Question 1

List three problems with Unity's serialization mechanism

Question 2

If your game is written with a straight object-oriented style, then you can test whether an object is of a given type using the **is** operator in C#. But in Unity, all your game objects are of one type (GameObject). How do you determine whether a given game object is a specific kind of game object (e.g. one representing a player)?

Question 3

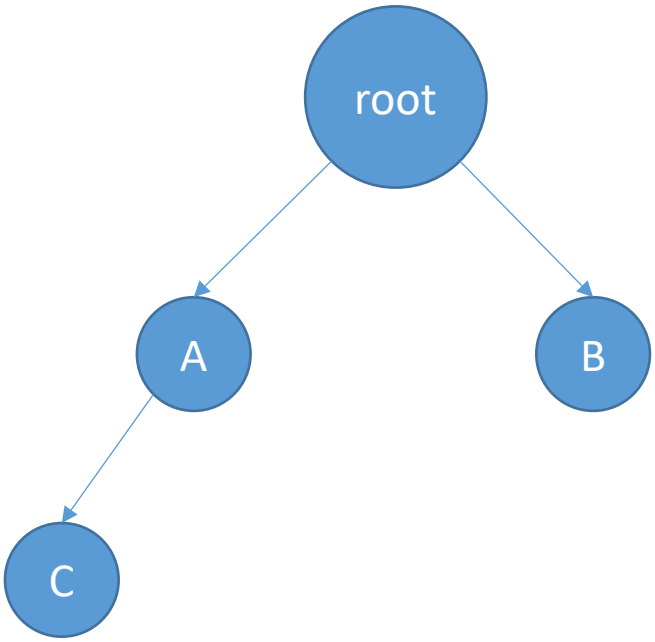
Your friend wrote a game in Unity. Here's their code:

```
void Update(GameObject o) {
   transform.position += transform.position + velocity*Time.deltaTime;
}
```

It compiles fine, but the object never moves. Explain why.

Question 4

Suppose you have some game objects in the scene hierarchy (Unity's version of a scene graph):



Where root is the root of the hierarchy, and A, B, and C are GameObjects with local transform matrices T_A, T_B, and T_C, respectively, i.e. T_X translates X's local coordinate system into the coordinate system of its parent. What is the transform matrix from C to the world coordinate system (i.e. the coordinate system of the root)?

Question 5

You're writing a soccer game. You want all the fan NPCs (non-player characters) to go crazy when there's a goal, and the AI programmer has written a component called FanNPC for those characters that has a method called GoCrazy() that will make the character dance around. You've added a trigger to the GameObject for the goal, and you'd added a script component to the goal with an OnTriggerEnter2D method to notice when a ball enters the goal:

```
void OnTriggerEnter2D(Collider2D other) {
    if (other.name == "the ball")  // Not great style, but makes the problem simpler
        ???
}
```

The problem is that it's not the goal that you want to know about the ball, it's all the little fan NPCs. What do you write in the ??? area to call the GoCrazy() method on all the fan NPCs?

Question 6

In object-oriented programming, if you wanted to have a certain kind of thing in your game, such as a particular kind of enemy, you might do it by making a new subclass of game objects, and add code to its constructor to assign the proper values to its fields. However, in games with component architectures and serialization (such as Unity), you use a different mechanism? What is that mechanism?

Question 7

You write some code and it gets a compiler warning on the following line:

```
float x = Math.Sin(theta)+y*0.5;
```

And says that you can't implicitly convert a double to a float. What's wrong, and how do you fix it?

Question 8

Explain why game engines such as Unity do everything with 4×4 matrices even when they're only operating in 3D.

Question 9

Suppose you were implementing a particle simulation. Would you use Euler or Verlet? Why?

Question 10

Suppose you build a game with a rock/paper/scissors mechanic with four choices. The win/lose table for the mechanic looks like this (the cells show the winner in each case):

	A	**B**	**C**	**D**
A	Draw	A	C	D
B	A	Draw	B	B
C	C	B	Draw	D
D	D	B	D	Draw

This is a bad game design. Explain why.

Question 11

Suppose you're writing a game in Unity and it has a component class, ScoreManager, which keeps track of scores. You know there will only ever be one score manager in the game, and you need to write some code that finds it and calls a method on it. What's the simplest way to do that?

Question 12

A. What IDE do you use with Unity?

B. Explain how to use it to set a breakpoint in your game.

Question 13

Explain what a material is in computer graphics.

Question 14

Many rendering engines render transparent objects separately from other (opaque) objects. That is, they draw all the opaque objects first, and then the transparent ones. Explain why. Is there special processing that needs to be done when drawing the transparent objects that isn't necessary for opaque ones?

Question 15

Explain why stiff springs are a problem for physics engines.