This week we talked about rays and raycasting. We talked about how to find if a ray is colliding with another object on its path. We talked about how ray tracing can make games seem more realistic for the player. We also talked about how bullets in games are generally just rays and checking where they first hit. We focused on how a ray intersects with a sphere. There are three ways it will intersect 0, 1, or 2 times. If the ray is starting in the sphere or it intersects only in the negative the ray is invalid most of the time. When the ray has a collision there is another vector that is perpendicular to the surface, called a normal vector.

The length of the ray at its collision is defined as point + alpha*direction. To find the alpha of this ray we need to use the quadratic formula as well as the center and radius of the sphere. We now need to find the variables of the quadratic equation. A is equal to the ray direction dot product with itself. B is 2 times the ray direction dot product of ray origin subtracted from the sphere center. C is ray origin minus sphere center dot product of itself and then subtract that by the sphere radius squared. Now that we have all of the variables we find the discriminant. If it is less than 0 then there is no intersection and you can finish right now. If it is equal to 0 then it is a tangent line where there is only one intersection. If it is greater than 0 there are multiple intersections.

To find the normal vector you need the point of intersection and the center point of the sphere. You find the vector from the center of the sphere to the intersection. Once you have that vector you need to normalize it. Another thing we had to find was the distance from the ray origin to the point of intersection. The distance is the same thing as the alpha variable we found already.

Me and my partner worked well together. When I had questions I asked him and we would figure it out together. I had issues with some of the tests and he helped me.

I did not go to office hours this week. I felt that the slides and the clarification video posted were pretty straight forward and easy to follow.

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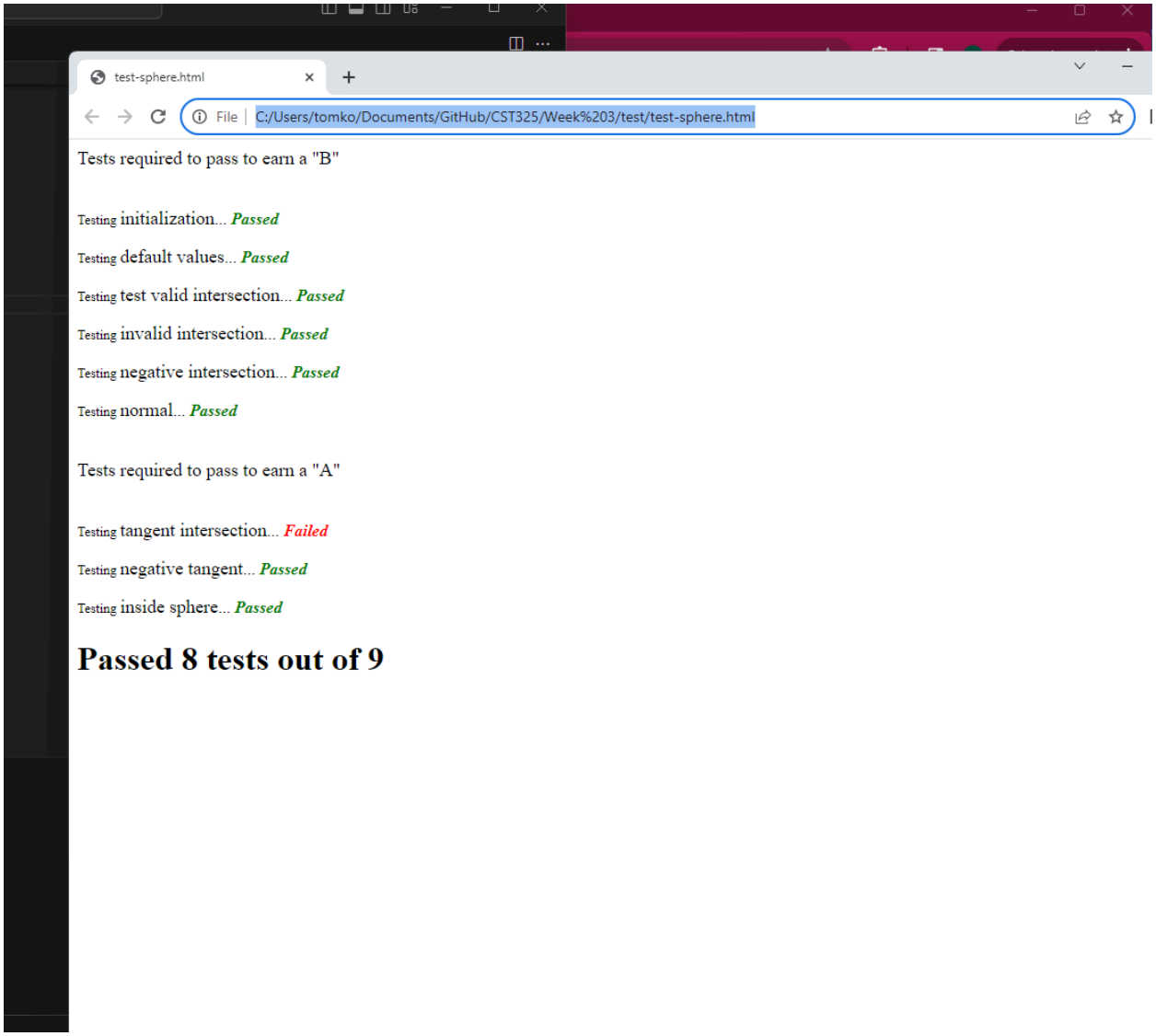
test-sphere.html
File | C:/Users/tomko/Documents/GitHub/CST325/Week%203/test/test-sphere.html
Tests required to pass to earn a "B"
Testing initialization... Passed
Testing default values... Passed
Testing test valid intersection... Passed
Testing invalid intersection... Passed
Testing negative intersection... Passed
Testing normal... Passed
Tests required to pass to earn a "A"
Testing tangent intersection... Failed
Testing negative tangent... Passed
Testing inside sphere... Passed
Passed 8 tests out of 9

test-sphere.html

File | C:/Users/tomko/Documents/GitHub/CST325/Week%203/test/test-sphere.html

Tests required to pass to earn a "B"

Testing initialization... ***Passed***

Testing default values... ***Passed***

Testing test valid intersection... ***Passed***

Testing invalid intersection... ***Passed***

Testing negative intersection... ***Passed***

Testing normal... ***Passed***

Tests required to pass to earn a "A"

Testing tangent intersection... ***Passed***

Testing negative tangent... ***Passed***

Testing inside sphere... ***Passed***

Passed 9 tests out of 9