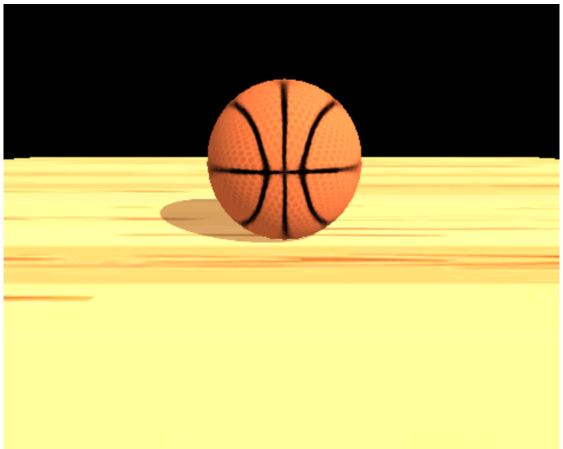
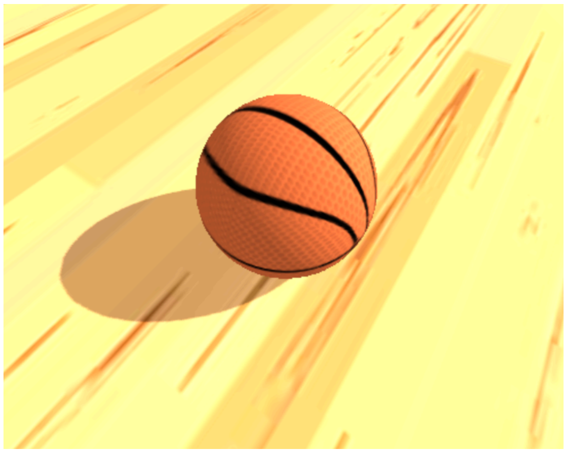
CISC 3620 Homework 3

Applying Lights, Shadows, and Textures in Three.js

Part 1: Basic 3D Basketball Scene in Three.js

Objective: To create a simple 3D scene featuring a basketball and a basketball court using Three.js. This assignment will cover the creation of a floor, a basketball, and basic lighting effects. Your final submission should look something like this:





Instructions:

1. Fork the CodePen:

You will start with the provided **CodePen** that contains the HTML, CSS, and a basic JavaScript structure. Make sure to fork it to your own account to make changes.

2. Implement the following:

- **Create the Ground Plane (10 points):**
  - Create a plane geometry that lies horizontally on the x-axis
  - Apply this **wood texture** to the plane
  - Enable the plane to receive shadows from objects in the scene.

- **Create the Basketball (10 points):**
  - Add a sphere geometry to represent the basketball.
  - Apply this **basketball texture** to the sphere.
  - Enable the sphere to cast shadows.
  - Adjust the position of the basketball so that it appears to rest slightly above the floor.

- **Add Ambient Light (10 points):**
  - Include an ambient light source to provide general illumination throughout the scene.

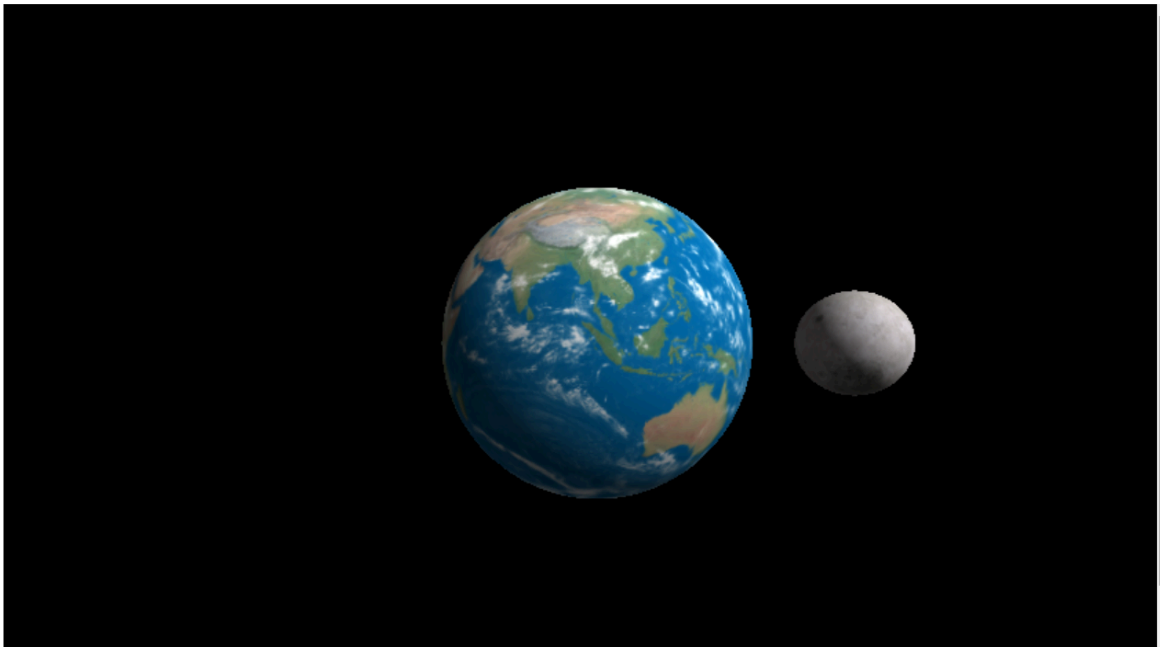
- **Add a Directional Light (10 points):**
  - Create and position a directional light to simulate sunlight or overhead stadium lighting.
  - Ensure that it casts shadows from the basketball onto the court.

- **Add Orbit Controls (10 points):**
  - Enable the user to rotate, zoom, and pan the camera around the scene easily.

Total Points: **50**

Part 2: Basic 3D Earth and Moon Simulation in Three.js

Objective: In this assignment, you will create a basic 3D model of the Earth and Moon using the Three.js library. You will implement appropriate textures, positions, rotation animations, and lighting for both celestial bodies.



1. Fork the CodePen:

You will start with the provided **CodePen** that contains the HTML, CSS, and a basic JavaScript structure. Make sure to fork it to your own account to make changes.

2. Implement the following:

- **Create the Earth (15 points):**
  - Create a sphere geometry for the Earth that has a radius of 1 unit, with a grid made up of 32 segments horizontally and 32 segments vertically.
  - Apply the **Earth texture**
  - Position the earth at the center of the scene.

- **Create the Moon (15 points):**
  - Create a sphere geometry for the Earth that has a radius of 0.27 units, with a grid made up of 32 segments horizontally and 32 segments vertically (indicating it's smaller than the Earth).
  - Apply the **Moon texture**
  - Position the moon 5 units away from the Earth on the x-axis.

- **Implement Lighting (10 points):**
  - Include an ambient light source to provide general illumination throughout the scene.
  - Create and position a directional light to simulate sunlight. Ensure the light casts shadows and is positioned to the side, pointing towards the Earth.

- **Implement Rotation Animations (10 points):**
  - Earth Rotation:
    - Add code to rotate the Earth around its y-axis at a speed of 0.03 radians per frame.
  - Moon Rotation and Orbit:
    - Using the provided variables for the Moon's orbital angle and orbital radius, implement the Moon’s position updates by multiplying the moonOrbitalRadius by the cosine of moonOrbitAngle (x-axis) and sine of moonOrbitAngle (z-axis) to create a circular orbit around the Earth.
    - Rotate the Moon around its own y-axis at a speed of 0.01 radians per frame.

Total Points: **50**

Submission:

You will have one week to complete this assignment.

When you have completed your assignment, **please submit the links to your CodePen projects (one link for each part, so two links total) along with a brief reflection (1-2 paragraphs)** on the challenges you faced during implementation and how you overcame them.