Homework 2 - Modeling

1. **Define uniform, attribute and varying variables.**

2. **What type is the shader and describe its function?**

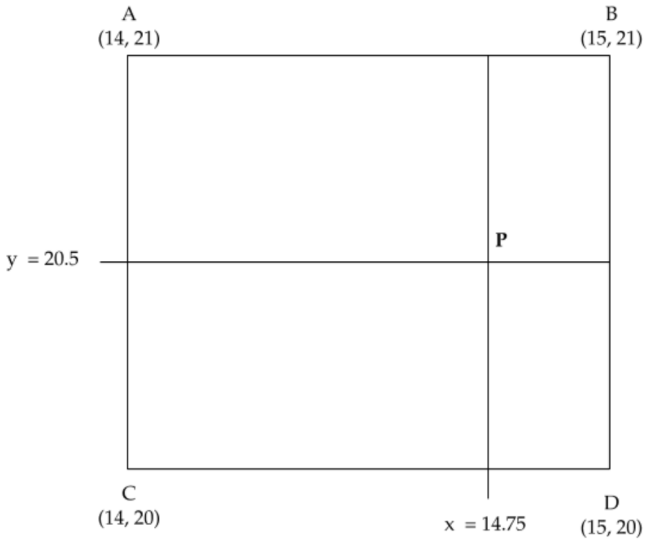
   (a)
   ```
   attribute vec2 a_Position;
   main() {
       gl_Position = vec4(0.5 * a_Position, 0.0, 1.0);
   }
   ```

   (b)
   ```
   main() {
       gl_FragColor = vec4(0.0, 0.0, 1.0, 1.0);
   }
   ```

3. **Using linear interpolation, calculate the color of the following points that are on the line defined by the 2D points p1 = [3,5] with color [255,0,0] and p2 = [10, 5] with color [0,0,255].**
   (a) [4.8, 5] (b)[7.5, 5] (b)[9, 5]

4. **Using barycentric coordinates, calculate the color for each of the following points inside the triangle defined by points p1 = [0,0,0], p2 = [3,5,0] and p3 = [6,0,0] with respective RGB colors c1 = [255, 0, 0], c2 = [0, 255, 0], c3 = [0, 0, 255].**
   (a) [1, 1, 0] (b) [3, 4, 0] (c) [5, 0.25, 0]

5. **Calculate the RGB color value for point P in the diagram below using bilinear interpolation. Show the intermediate values that you compute for interpolating along one of the two axes. The colors of the points A, B, C and D are the following:**
   A = RGB(0, 0, 0) B = RGB(200, 200, 200)
   C = RGB(200, 0, 0) D = RGB(200, 0, 0)



6. **Given a polygon with vertices P1, P2, P3, each represented by a 3D vector [x y z], what formula calculates the face's normal?**