

**CSci 5607, Spring 2022**  
**Assignment 1c: Triangles and Texture**  
**Due: Friday March 4<sup>th</sup>**

Name \_\_\_\_\_

Score (out of 100) \_\_\_\_\_

\_\_\_\_ The program robustly accepts extended scene description files that include texture images, texture coordinates and surface normal vectors. The program is able to robustly handle triangle definitions that include per-vertex normal directions and/or per-vertex texture coordinates in addition to vertex locations. The implementation is done in a way that enables easily working with triangle mesh models originally defined in .obj format. (5 pts)

\_\_\_\_ The program correctly computes ray/plane intersections, and correctly performs point-in-triangle testing using barycentric coordinates, enabling the rendering of scenes containing triangles as well as spheres. (20 pts)

\_\_\_\_ The program is capable of rendering triangles using flat shading, in which every pixel in a triangle is assigned the same color, obtained by correctly evaluating the Phong illumination equation using the unit length normal of the plane in which the triangle lies. (10 pts)

\_\_\_\_ The program is capable of rendering triangles using smooth shading, in which every pixel within a triangle is assigned a unique color, obtained by correctly evaluating the Phong illumination equation using a unit length normal direction interpolated from the three normal directions defined at the three triangle vertices. (15 pts)

\_\_\_\_ The program is capable of rendering textured spheres. An appropriate texture coordinate is computed at each ray/sphere intersection point using a pre-defined, hard-coded mapping. That texture coordinate is used to retrieve a correctly corresponding color from the texture map, which specifies the object's diffuse color in the Phong illumination model at that point. (20 pts)

\_\_\_\_ The program is capable of rendering textured triangles. The texture coordinate at the ray/triangle intersection point is correctly interpolated from the texture coordinates defined at each of the three triangle vertices. The interpolated texture coordinate is used to retrieve a correctly corresponding color from the texture map, which specifies the object's diffuse color in the Phong illumination model at that point. (25 pts)

\_\_\_\_ In addition to submitting a showcase image, the student has submitted plus sufficient additional scene description files and accompanying rendered images to successfully demonstrate all of the capabilities of their program, including the ability to render: at least one flat-shaded triangle, multiple smooth-shaded triangles, one or more textured triangles, and one or more textured spheres. (5 pts)

\_\_\_\_ Extra credit: The program is capable of reading a normal map from a file and correctly using the values in that map to appropriately vary the surface normal direction used when calculating the illumination equation at each point across the surface. The normal map can be applied to one or more triangles or to a sphere. (7 pts)