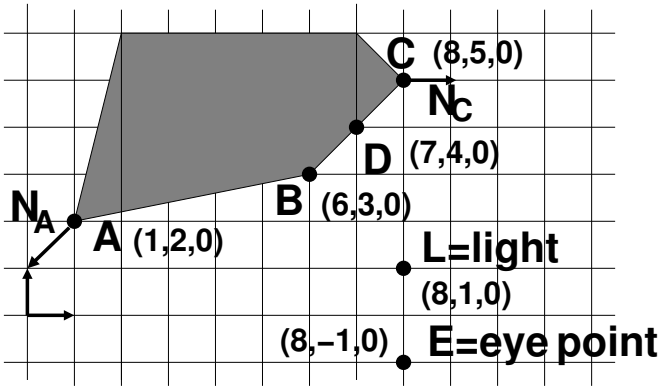
CPSC 314, Written Homework 3

Out: Mon 1 Mar
Due: Fri 19 Mar, 5pm
Value: 3% of final grade
Total Points: 100

Lighting and Shading (50 pts)

1. For the following questions, refer to the figure above and the parameters below. Show your work. Remember to normalize!



- ambient light color I_a is (.1,.2,.1)
- light color I_L is (1.0, 1.0, .9)
- diffuse material color k_d is (.3, .8, .9)
- ambient material color k_a is (.1, .1, .1)
- specular material color k_s is (1, 1, 1)
- shininess exponent is 20

a) (2 pts) Compute the normal at point B using per-vertex normals, interpolating between the provided normals for point A and point C.

b) (16 pts) Compute the ambient, diffuse, specular, and total illumination at points B, C, and D using the Blinn-Phong lighting model with the halfway vector, and the flat shading model.

c) (16 pts) Do those computations using the Gouraud shading model.

d) (16 pts) Do those computations using the Phong shading model.

Color (10 pts)

2. (10 pts) Convert the RGB triplet (.3,.5,.2) to the YIQ, HSV, and CMY color spaces. Show your work.

Rasterization (15 pts)

3. (15 pts) Give an algorithm for scan-converting a line with the Bresenham approach that works in the third octant (lines with slope between infinity and -1), rather than the first octant as described in class (lines with slope between 0 and 1).

Interpolation (25 pts)

4. (25 pts) Find the barycentric coordinates α, β, and γ for P, and use them to interpolate the the (r, g, b) color component at that point. Show your work.