Floyd (Richie) Richardson

(and Yuanfen)

ME 557

Homework #3 – Problem #1

There are a number of light source and material parameters to work with in this Problem. Just the ones we manipulated are: the light positions, their ambient, specular, and diffuse intensities, their attenuation coefficients, the spotlight's cone angle and direction, the diffuse, ambient, and specular materials, and the material shininess. The subject of this report, however, is endeavors to make the parameters of the light sources and material 'match up'. As such, only parameters which cooperate between at least one light source and the material to create an aspect of the display will be discussed. This eliminates attenuation coefficients and spotlight cone parameters. Also, material shininess, while an important parameter, only determine how widespread the effect of specular lighting is. A properly described system should not fail when material shininess is altered, so it will be excluded from the scope of this report.

Ambient material and light parameters do not rely upon distances from the light source, making them a good starting point for this analysis. The ambient light upon any visible surface is simply inside the spotlight, and outside the spotlight. In the case of our latest code, the parameters are such that the formulas read or . A slightly dark magenta for a base inside the spotlight and a dark magenta for the base outside the spotlight, on the edges of the direct light's diffuse region.

A safe way to choose initial specular and diffuse intensities, since distance is not actually considered in this formulation, would be to make sure the maximum lighting on a point (if both light sources are at the camera and the spotlight points directly at the sphere) is less than or equal to 1.0 in R, G, and B. This suggest intensities of about 0.15, since the materials for specular lighting and diffuse lighting are and respectively in our current code and there are two light sources.

Unfortunately, since the light sources are not pointing from the camera position, this does not properly balance the light sources. From this point on, intensities are a matter of trial and error, unless angles are individually calculated. I haven't had an opportunity to see our code work personally, since my computer can only render objects in a single color and my partner has been sick and barely in contact recently. Our current specular intensities are 8.0 and 5.5, and our current diffuse intensities are 3.0 and 1.0. This was not what I came up with originally, largely because I was not confident in my ability to extrapolate proper intensities from numbers to properly balance the light sources. From a cursory inspection, these values seem very high, which leaves me even less confident in my ability to estimate intensities.