VGP352A – CG Programming II

Final – **Pretest**

Name:_____

1. The typical notation for a BRDF is $f(\omega_i, \omega_o)$. What does ω_i represent? What does ω_o represent?

2. There are two common types of BRDFs. One is *analytic*, of which we have implemented several this term. What is the other common type?

3. What types of materials exhibit a strong Fresnel factor? Some examples may be helpful.

4. In a surface with a strong Fresnel factor, what happens as $v \cdot h$ approaches zero? If it helps, the Fresnel function is:

$$F = 1/2 \frac{(g-c)^2}{(g+c)^2}\left(1+\frac{\left[c(g+c)-1\right]^2}{\left[c(g-c)+1\right]^2}\right)$$

$$c = v \cdot h$$

$$g = \sqrt{n^2+c^2-1}$$

5. What is the underlying theoretic basis of the Cook-Torrance BRDF?

6. In the specular portion of the Cook-Torrance BRDF, below, what does D represent? What does G represent?

$$f_s = \frac{F \times D(n \cdot h) \times G(n \cdot \omega_i, n \cdot h, n \cdot \omega_o)}{(n \cdot \omega_i)(n \cdot \omega_o)}$$

7. What is the underlying theoretic basis of the Lafortune BRDF?

8. What is anisotropy?

9. In addition to the usual N, L, and V vectors, what is an additional vector that is used in anisotropic lighting calculations?

10. Given the following made up BRDF, which parameters control the anisotropy? In this equation, ω_o' is the projection of ω_o onto the plane formed by T and B.

$$f(\omega_o, \omega_i) = (N \cdot H)^{k(\omega_o' \cdot T) + j(\omega_o' \cdot B)}$$

11. Using the BRDF from the previous question, what happens when the anisotropy parameters are equal?

12. Using the BRDF from the previous question, pick one of the parameters that controls the anisotropy and describe what happens when its value is larger than the value of the other parameter.