

Basic Shading and Lighting

1

Shading

- Gouraud shading
 - interpolate vertex colors across triangle
- Phong shading
 - interpolate vertex normals across triangle
 - interpolate n_x , n_y , and n_z ; renormalize
 - use normal at pixel to evaluate lighting equation

2

Lighting

- Ambient
 - all surfaces get some light
 - approximation of indirect illumination
 - Diffuse
 - surfaces “more perpendicular” to the light direction are brighter
 - $k_{\text{diffuse}} = \text{toLightVector} * \text{normalVector}$
 - if ($k_{\text{diffuse}} < 0$) $k_{\text{diffuse}} = 0$
 - Phong (specular)
 - for glossy, shiny, reflective surfaces
 - highlights where reflected light ray hits the COP (eye)
 - $k_{\text{phong}} = \text{pow}(\text{reflectedLightVector} * \text{eyeVector}, \text{phongExponent})$
- $\text{color} = \text{origColor}(k_{\text{ambient}} + (1 - k_{\text{ambient}})k_{\text{diffuse}} + k_{\text{specular}})$