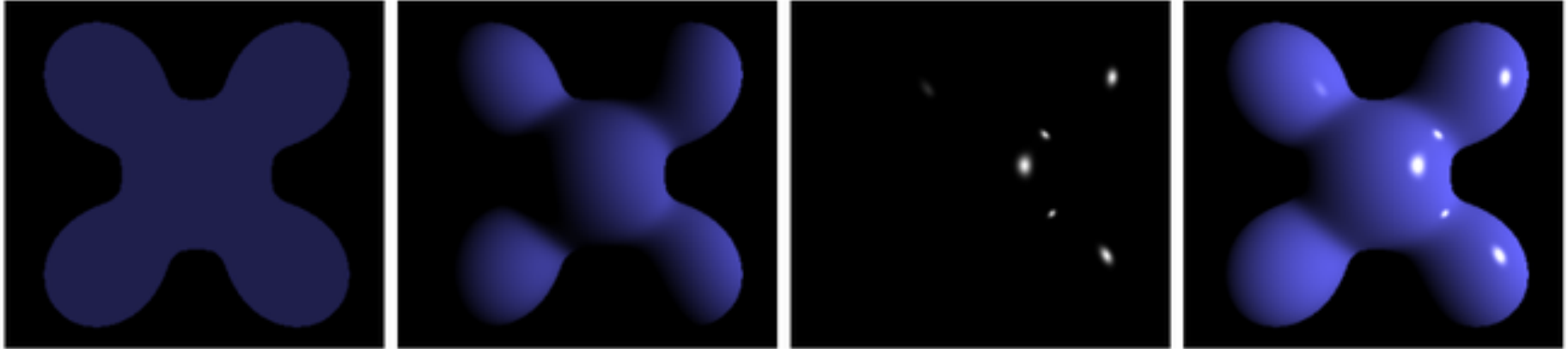


# Shading / Light

Thanks to Srinivas Narasimhan, Langer-Zucker, Henrik Wann Jensen, Ravi Ramamoorthi, Hanrahan, Preetham

# Phong Illumination Model



Ambient + Diffuse + Specular = Phong Reflection

$$I_p = k_a i_a + \sum_{m \in \text{lights}} (k_d (L_m \cdot N) i_d + k_s (R_m \cdot V)^\alpha i_s).$$

See Shirley, Ch 10 and  
[http://en.wikipedia.org/wiki/Phong\\_shading](http://en.wikipedia.org/wiki/Phong_shading)

chalkboard

# Phong vs. Gouraud Shading

Key: What is interpolated  
when shading a triangle?



chalkboard

See Shirley, Ch 10 and

[http://en.wikipedia.org/wiki/Gouraud\\_shading](http://en.wikipedia.org/wiki/Gouraud_shading)

# Shaders

We reviewed operations that typically happen at a vertex and at a fragment as a preview to writing our own shaders.

We looked at a few simple GLSL shaders, which can be reviewed at this website:

[http://nehe.gamedev.net/article/glsl\\_an\\_introduction/25007/](http://nehe.gamedev.net/article/glsl_an_introduction/25007/)

## Practice Problems

In the Phong Illumination Model, what parameters are properties of the material? Properties of the light source?

Sketch a diagram showing all of the parameters in the Phong Illumination Model.

Give several examples of real-world effects that the Phong Illumination model does not capture.

Explain the difference between Phong and Gouraud shading. Give an example where the difference would be visible in the final rendering.

Give examples of properties you may compute in a vertex shader. Give examples for a fragment shader.