**Week 9 Tutorial**

**6.2** In the development of the Phong reflection model, why do we not consider light

sources being obscured from the surface by other surfaces in our reflection model?

The reasons are the fast computer time and the Phong model is a local lighting model. In addition, in pipeline architecture, there is basically no way to consider global effects due to the design of the pipeline architecture.

**6.3** The Phone reflection model uses four vectors to calculate a color for an arbitrary point on a surface.  Why do we use these four vectors?

The four vector are normal, light, viewer and reflector. They are necessary because:

• Vector Normal: shows where is the object.

• Vector Light: illustrate where is the light source.

• Vector Viewer: shows where is the viewer.

• Vector Reflector: represents where does perfect reflection go.

**6.4** How should the distance between the viewer and the surface enter the rendering

calculations? Light intensity weakens over distance, therefore this distance is important. In addition, the light intensity is inverse proportional to the distance.

**6.7**   Let φ be the angle between the normal and the halfway vector, ϕ be the angle between the viewer and the reflection angle, and θ be the angle between the normal and the light source.  Show that if **v** lies in the same plane as **l**, **n**, and **r**, then the halfway angle satisfies  ϕ = 2φ.

What relationship is there between the angles if **v** is not co-planar with the other vectors? We can see in the picture the relation of the mentioned angles.

