

3. (a) Distinguish between diffuse and specular reflectors. What is meant by global illumination? State briefly how it can be approximated. [6]
- (b) Describe and illustrate the Phong lighting model for a single point light source. Explain carefully the purpose of the parameters of the model. [6]
- (c) With appropriate diagrams and equations, explain how interpolated shading is achieved. What is meant by per-pixel shading and why is it expensive to calculate? Give an expression for the per-pixel shading value at the origin,  $(0, 0)$ , for a triangle:

$$\{(-1, -1), (1, -1), (0, 1)\},$$

if the vertices have the illumination and normal attributes,

$$\{I_0, \mathbf{n}_0\}, \{I_1, \mathbf{n}_1\}, \{I_2, \mathbf{n}_2\}.$$

[6]

- (d) Explain how texture mapping works in terms of the necessary coordinate transformations required. [7]