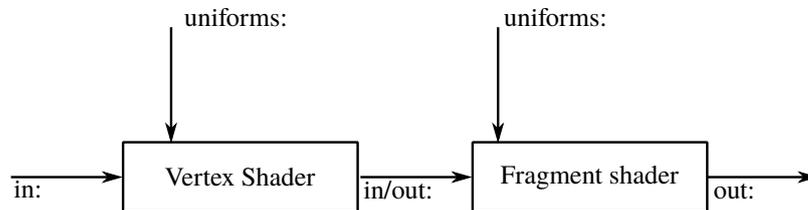


4 Graphics (RKM)

Consider rendering a triangular mesh using OpenGL. A uniform material is used for the entire mesh and the reflection model of the material consists of ambient, diffuse and specular components. There are two point light sources in the scene. Given these assumptions, answer the following questions:

- (a) Gourand and Phong shading are two different methods of interpolating colours between vertices. Explain how each method interpolates colours. [5 marks]
- (b) Discuss the trade-offs in terms of quality and computational costs for Phong and Gourand shading. Assume that the number of rendered pixels is much larger than the number of vertices. What kind of artefacts can one of the methods produce and what is the reason for those artefacts? [7 marks]
- (c) For each of Gourand and Phong shading, explain how you would implement each shading method using vertex and fragment shaders in OpenGL. Complete the diagram shown below by listing all inputs, outputs and uniforms for each shader. Then, explain what is computed in each shader in the case of both shading methods. There is no need to write equations or code, but you may include them if it helps your explanation.



[8 marks]