Tutorial 4: Shading

A graphics scene is to made up of a set of triangles. When one of the triangles is in the standard viewing system (viewpoint at the origin) it has vertex coordinates:

Point 1: [-10,20,30]
Point 2: [15,25,25]
Point 3: [5,-20,50]

1. Find the outer normal vector of the surface on the assumption that it is visible from the viewpoint.

2. The scene is lit by a single light source which is located at position [-5, -40, -50]. Assuming that only diffuse lighting is being used, find the brightest point on the triangle.

3. If the triangle is to be drawn using interpolation shading, which will be the brightest point, assuming that the incident light at each point of the triangle is a constant (no inverse square attenuation of the light).

4. Would the result be different if the inverse square law was taken into account?

5. The triangle is part of a bigger surface. A fourth point [-25,25,40] forms another two triangles. One is with Point 1 and Point 2, and the other with Point 1 and Point 3. There are no other faces that meet at point 1.

What is the unit normal vector at point 1 that would be used for Gouraud shading or Phong shading.