a) **Difference between Phong shading and Phong lighting (Phong reflection model)**:

- **Phong lighting (Phong reflection model)** refers to a mathematical model used to calculate the color at a point on a surface, based on three components: ambient, diffuse, and specular reflections.
- **Phong shading** refers to the interpolation technique used to calculate pixel colors in a rendered scene by applying the Phong reflection model. Instead of calculating lighting per vertex (like in Gouraud shading), Phong shading calculates lighting per pixel by interpolating surface normals across the pixels of a polygon.

Key Difference: Phong lighting is a model for light-surface interaction, while Phong shading is a method of applying this model at the pixel level.

b) **Difference between flat shading, Gouraud shading, and Phong shading**:

- **Flat shading**: Lighting is calculated once for each polygon. The entire polygon has a uniform color, based on the polygon's normal vector.
    - *Pros*: Computationally efficient, simple.
    - *Cons*: Poor visual quality, especially for curved surfaces; lacks smooth transitions between polygons.
- **Gouraud shading**: Lighting is calculated at the vertices, and the color is interpolated across the surface of the polygon.
    - *Pros*: More efficient than Phong shading; provides smoother results than flat shading.
    - *Cons*: Can miss highlights if not positioned at vertices; specular highlights might not be properly captured or may appear washed out.
- **Phong shading**: Lighting is calculated per pixel by interpolating the normals between vertices and then applying the Phong reflection model.
    - *Pros*: Very smooth shading; handles specular highlights well.
    - *Cons*: Computationally more expensive.

Best for simulating highlights: Phong shading is better for simulating highlights because it computes lighting at the pixel level, allowing it to capture fine details like specular highlights more accurately than Gouraud shading.

c) **Difference between a directional light and a point light**:

- **Directional light**: Light rays are parallel and come from a specific direction, as if emitted by a distant light source (like the sun). It does not attenuate over distance.
- **Point light**: Emits light in all directions from a specific position in space. It attenuates as the distance from the light source increases.

d) **Does the eye position influence the shading of an object in any way?**
Yes, the eye (or camera) position influences the shading, especially the specular reflection. The specular component in the Phong reflection model depends on the viewing direction relative to the surface normal and the light source. The angle between the reflected light ray and the viewer’s position affects the intensity and size of specular highlights.

e) **Effect of setting the specular term to (0, 0, 0)**:
Setting the specular term to (0, 0, 0) removes the specular reflection component, meaning no highlights will appear on the object. The surface will look dull and will only show diffuse and ambient reflections, resulting in a matte appearance.

f) **Effect of increasing the shininess exponent (α)**:
Increasing the shininess exponent (α) in the Phong reflection model makes the specular highlight smaller and sharper. A higher α value indicates that the surface is smoother, leading to a more focused reflection. Conversely, a lower α value produces a broader, softer highlight.

g) **Coordinate space used for lighting computation**:
Typically, lighting is computed in **world space** or **view space** (camera space). In world space, the lighting calculations use the actual positions and normals of objects relative to the world coordinates. In view space, the objects are transformed relative to the camera, simplifying some lighting calculations such as the eye position being at the origin.