1. [10 points] True or false questions (with wrong answer penalty):
   a) Can we obtain an isometric of the cube by a single rotation about a suitably chosen axis?
   b) Suppose we want to create a cube that has a black and white checkerboard pattern texture mapped to its faces. Can we texture map the cube so that the color alternate as we traverse the cube from face to face?

2. [20 points] Suppose that a monochrome display has a minimum intensity output of $I_{\text{min}}$ – a CRT display is never completely black – and a maximum output of $I_{\text{max}}$. Given that we perceive intensities in a logarithmic manner, how should we assign $k$ intensity levels such that the steps appear uniform?

3. [20 points] Find the transformation matrix for the rotation $\theta$ of an angle about the point $(a, b)$.

4. [20 points] Find the transformation matrix for the reflection about the line $y = 2x - 1$.

5. [20 points] Derive the transformation matrix of the reflection about the plane through the origin with the normal vector $u$ as defined below: $T(x) = x - (2x \cdot u)u / |u|^2$.

6. Simple question or calculation problems:
   a) [10 points] A point light has attenuation coefficients (1, 2, 1). At what distance is the attenuation 0.04?
   b) [10 points] In the exponential fog equation, find the distance at which the blending coefficient $f$ is 0.5.
   c) [10 points] Given the vertices of a 2D polygon as below, please find it area: A(6, 6), B(4, 3), C(6, -4), D(-1, -3), E(-6, -6), F(1, 2), and G(-3, 3).

7. [20 points] Find the surface normal $n$ for the following surface: $x = 2 \cos u \cos v$, $y = 3 \sin u \cos v$, and $z = 4 \sin v$.

8. [20 points] If $A$ is orthogonal, show that $det(A) = \pm 1$.

9. [20 points] A method of approximating a sphere starts with a regular tetrahedron, which is constructed from 4 triangles. Find its vertices, assuming that it is centered at the origin and has one vertex on the $z$-axis.

10. [20 points] Please create an isometric view of a cube with size of 2 by 2 by 2 and centered at origin by providing a concatenated matrix $M$.