

# Sample Quiz 1

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1. Given four points in an  $O - XYZ$  coordinates:

$$\begin{array}{ll} A(0, 0, 0), & B(1, -1, 0) \\ C(0, 1, 1) & D(-1, 0, 1). \end{array}$$

- (a) Find the distance between A and D.
  - (b) Find the area of the parallelogram formed by the vectors  $\vec{AB}$  and  $\vec{AC}$ . Are A, B, and C are in a same line?
  - (c) Find a *unit* vector which is orthogonal to both  $\vec{AB}$  and  $\vec{AC}$ .
  - (d) Find the angle between  $\vec{AB}$  and  $\vec{AC}$ .
  - (e) Find the vector and component projection of vector  $\vec{AB}$  on the vector  $\vec{AC}$ .
  - (f) Find the equation of the sphere which centered at D with the radius 2.
  - (g) Find the equation of line which passes through A and B in both parametric and symmetric form.
  - (h) Find the mid-point between A and B.
  - (i) Are A, B, C, and D are co-planar?
  - (j) Find the equation of plane which passes through C and orthogonal to the vector  $\vec{AB}$ .
  - (k) Find the distance from the point D to the plane above.
2. Identify (sphere, ellipsoid, hyperboloid, paraboloid, cylinder, cone), draw traces  $z = k$ , and sketch the following quadric surfaces.
- (a)  $z = x^2 + y^2 + 1$ .
  - (b)  $9x^2 + y^2 - z^2 - 2y + 2z = 0$ . **Hint:** use complete square.

3. **Name** the following equations (line, plane, surface, paraboloid, ... ). If the equation is a line, find the direction of the line and a point on the line; if it is a plane, find the normal direction and a point on the plane; if it is a quadric surface, sketch it using suitable traces.

- (a)  $\frac{x}{2} = \frac{y-8}{-1} = \frac{z+2}{0}$ .
- (b)  $x - 2y + 1 + 4z = 0$ .
- (c)  $x = y^2 + z^2/4$ .

4. When the following equation

$$x^2 + x + y^2 - 3y + z^2 = a$$

is a sphere? Find the center and the radius when the equation is a sphere.

5. Short question/problems presented in class.