

Math 2211: Recitation 2 (T)

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(1) Solve any **three** the following problems:

(a) Which of the points $(6, 2, 3)$, $(-5, -1, 4)$ and $(0, 3, 8)$ is closest to the xz -plane. Which point lies in the yz -plane.

(b) Show that the equation represents a sphere. Find its center and radius.

$$2x^2 + 2y^2 + 2z^2 = 8x - 24z + 2$$

(c) Find an equation of a sphere if one of its diameters has endpoints $(2, 1, 4)$ and $(4, 3, 10)$.

(d) . Determine whether the following points lie on straight line.

$$A(2, 4, 2), \quad B(3, 7, -2), \quad C(1, 3, 3)$$

(2) Solve the following problems. (**Do any two of them**).

(a) Find an equation of the sphere that passes through the point $(4, 3, -1)$ and has center $(3, 8, 1)$.

(b) Find an equation of the set of all points equidistant from the points $A(-1, 5, 3)$ and $B(6, 2, -2)$.

(c) Find $\mathbf{a} + \mathbf{b}$, $2\mathbf{a} - 3\mathbf{b}$ and $|\mathbf{a} - \mathbf{b}|$ where $\mathbf{a} = 2\mathbf{i} - 4\mathbf{j} + 4\mathbf{k}$ and $\mathbf{b} = 2\mathbf{j} - \mathbf{k}$.

(Bonus) Solve the following integrals. **(Do any two of them).**

(a) Determine whether the given vectors are orthogonal, parallel, or neither

$$\mathbf{a} = 2\mathbf{i} + 6\mathbf{j} - 4\mathbf{k} \quad \mathbf{b} = -3\mathbf{i} - 9\mathbf{j} + 6\mathbf{k}.$$

(b) Find a unit vector that is orthogonal to both $\mathbf{i} + \mathbf{j}$ and $\mathbf{i} + \mathbf{k}$.

(c) Find the scalar and vector projections of \mathbf{b} onto \mathbf{a} where

$$\mathbf{a} = \langle 3, -4 \rangle, \quad \mathbf{b} = \langle 5, 1 \rangle.$$