Essentials of Analytical Geometry and Linear Algebra I, Class #13

Innopolis University, November 2020

1. Find the equation of the sphere which passes through the points $(2, 7, -4)$ and $(4, 5, -1)$ has its centre on the line joining the these two points as diameter.

2. Find the equation of the sphere which touches the coordinate axes, whose centre lies in the positive octant and has a radius 4.

3. Show that the plane $4x - 3y + 6z - 35 = 0$ is a tangent plane to the sphere $x^2 + y^2 + z^2 - y - 2z - 14 = 0$ and find the point of contact.

4. Obtain the equations to the sphere through the common circle of the sphere $x^2 + y^2 + z^2 + 2x + 2y = 0$ and the plane $x + y + z + 4 = 0$ which intersects the plane $x + y = 0$ in circle of radius 3 units.

5. Find the equation of the sphere which touches the plane $3x+2y-z+2 = 0$ at the point $(1, -2, 1)$ and cuts orthogonally the sphere $x^2+y^2+z^2-4x+6y+4 = 0$.

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1. Find the equation of the sphere with the centre at $(1, 1, 2)$ and touching the plane $2x - 2y + z = 5$.
2. Find the equation of the sphere which passes through the points $(1, 0, 0)$, $(0, 1, 0)$ and $(0, 0, 1)$ and has its centre on the plane $x + y + z = 6$.
3. Find the equation of the sphere passing through the points $(1, 0, -1)$, $(2, 1, 0)$, $(1, 1, -1)$ and $(1, 1, 1)$.
4. Find the equation of the sphere tangential to the plane $x - 2y - 2z = 7$ at $(3, -1, -1)$ and passing through the point $(1, 1, -3)$.
5. Find the centre and radius of the circle $x^2+y^2+z^2-8x+4y+8z-45 = 0$, $x - 2y + 2z = 3$.
6. Find the equation of the sphere having the circle $x^2 + y^2 + z^2 = 5$, $x - 2y + 2z = 5$ for a great circle. Find its centre and radius.
7. Prove that the circles $x^2 + y^2 + z^2 - 2x + 3y + 4z - 5 = 0$, $5y + 6z + 1 = 0$ and $x^2 + y^2 + z^2 - 3x - 4y + 5z - 6 = 0$, $x + 2y - 7z = 0$ lie on the same sphere and find its equation.