ANALYTIC GEOMETRY, PROBLEM SET 9

Mostly distances in 3D.

1. Find the distance from the point $P(1, 2, -1)$ to the line $d : x = y = z$.

2. Find the distance from $P(3, 1, -1)$ to the plane $\pi : 22x + 4y - 20z - 45 = 0$.

3. Find the distance between the planes
$\pi_1 : 2x - 3y + 4z - 7 = 0$ and $\pi_2 : 4x - 6y + 8z - 3 = 0$.

4. Find the distance between the lines $d_1 : \frac{x-1}{2} = \frac{y+1}{3} = \frac{z}{1}$ and $d_2 : \frac{x+1}{3} = \frac{y}{4} = \frac{z-1}{3}$.

5. Find the distance between the lines $d_1 : x = 1 - 2t$, $y = 3t$, $z = -2t + t$, where $t \in \mathbb{R}$ and $d_2 : x = 7 + 4s$, $y = 5 - 6s$, $z = 4 - 2s$, where $s \in \mathbb{R}$.

6. Show that the line
$d : \frac{x+1}{1} = \frac{y-3}{2} = \frac{z}{-1}$ and the plane $\pi : 2x - 2y - 2z + 3 = 0$ are parallel and find the distance between them.

7. Given the point $P(6, -5, 5)$ and the plane $\pi : 2x - 3y + z - 4 = 0$, find the coordinates of the symmetric P' of the point P with respect to the plane π.

8. Consider the point $P(4, 3, 10)$ the line $d : \frac{x-1}{2} = \frac{y-2}{4} = \frac{z-3}{5}$. Find the coordinates of the symmetric point P' of P with respect to the line d.

11. Find the geometric locus of the lines passing through a given point and having a constant distance to a given line.

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