

Math 203 — Planes

Problem 1. Give a standard form equation of the plane containing the points $(1, 2, 3)$, $(3, -1, 4)$ and $(1, 0, 1)$.

Problem 2. Give a standard form equation of the plane that contains the intersecting lines $\ell_1(t) = \langle 2, 1, 2 \rangle + t \langle 1, 2, 3 \rangle$ and $\ell_2(t) = \langle 2, 1, 2 \rangle + t \langle 2, 5, 4 \rangle$.

Problem 3. Give a standard form equation of the plane containing the point $(1, 2, 3)$ that is parallel to the plane $2x + 4y + 6z = 8$.

Problem 4. Consider the line $\ell(t) = \langle 5, 1, -1 \rangle + t \langle 2, 2, 1 \rangle$ and the plane $5x - y - z = -3$.

- Compute the dot product between $\mathbf{v} = \langle 2, 2, 1 \rangle$ and a normal vector \mathbf{n} for the plane.
- Use your previous answer to explain why the line and plane are not parallel.
- Since the line and plane are not parallel, they must intersect. Find the point of intersection by finding a value t so that $\ell(t)$ is a point on the plane.