

Discrete Optimization 2024 (EPFL): Problem set of week 2

March 14, 2024

1. Show that the three medians in a triangle with vertices v_1, v_2 , and v_3 meet at the point $\frac{1}{3}(v_1 + v_2 + v_3)$.
2. Find the hyperplane passing through $(1, 1, 1)$ that is perpendicular to both hyperplanes $\{x + 2y + z = 2\}$ and $\{x - y - 3z = 8\}$ in \mathbb{R}^3 .
3. Find the closest point to $(3, 5, 4)$ on the hyperplane $\{2x + 4y - z = 3\}$ in \mathbb{R}^3 .
4. Find the distance of the origin O to the line of intersection of the hyperplanes $\{x + y + z = 1\}$ and $\{2x - y + 3z = 1\}$ in \mathbb{R}^3 .
5. Find a point that is inside the tetrahedron whose facets are: $\{x + y + z = 1\}$, $\{2x - 3y - z = 2\}$, $\{x - 3y + z = 4\}$, and $\{2x - y + 3z = 1\}$.