

Linear algebra, WNE, 2018/2019 meeting 22.

18 December 2018

Problems

1. Find the projection of $p = (1, 2, 1) \in \mathbb{R}^3$:

- onto plane M described by equation $2x + 3y - z = 2$,
- onto line $L = (3, 2, -1) + \text{lin}((1, -1, 1))$.

2. Find a system of equation and a parametrization of

- the line in \mathbb{R}^3 going through $(3, 3, 4), (1, 2, 3)$,
- the plane going through $(3, 0, 1), (2, 1, 0), (1, 1, 1)$.
- the hyperplane going through $(3, 2, 1, -1)$ and perpendicular to the hyperplane described by the following system of equations

$$\begin{cases} a + b + c + d = -9 \\ a - b + c + 2d = -4 \end{cases} .$$

3. Find a projection of $p = (2, 3, 1) \in \mathbb{R}^3$:

- onto plane M described by equation $x - 2y + z = 2$,
- onto line $L = (-1, 1, 0) + \text{lin}((1, 0, 1))$.

4. Calculate $\begin{bmatrix} 1 & 2 & 0 \\ 0 & 3 & 0 \\ 2 & -4 & 2 \end{bmatrix}^{2017}$.

5. Let $W \subseteq \mathbb{R}^3$ be described by $x - y + z = 0$. Find a formula for linear transformation of reflection across W^\perp .