

HW 3 - Analytic and Differential geometry 88-201

Submission deadline: April 22, 2025.

For the solution set in \mathbb{R}^3 of the following equations, determine which quadratic surfaces (or degenerate cases) are obtained:

$$x^2 + y^2 + z^2 + 2xz + 2y - 3 = 0 \quad (1)$$

$$\frac{5}{2}x^2 - x + \frac{3}{5}y^2 + y + 5z^2 + z = 0 \quad (2)$$

$$x^2 + y^2 + 6z^2 - 2x - 4y + 6 = 0 \quad (3)$$

$$2x^2 - 3y^2 - 6y - 6z - z^2 = 0 \quad (4)$$

$$5x^2 + 5z^2 + 12xy - 9z + \frac{101}{20} = 0 \quad (5)$$

$$32x^2 + 16xy + 2y^2 + 2z^2 - 17x + 2 = 0 \quad (6)$$

$$168x^2 + 192xz + 24z^2 + 144y^2 + 168y + 49 = 0 \quad (7)$$

$$4x^2 + 4xz - 3y^2 + z^2 + 15x - 12y - 3 = 0 \quad (8)$$