

Math 251: Final Exam Formula Sheet

$$\mathbf{u} \cdot \mathbf{v} = \|\mathbf{u}\| \|\mathbf{v}\| \cos \theta$$

$$\|\mathbf{u} \times \mathbf{v}\| = \|\mathbf{u}\| \|\mathbf{v}\| \sin \theta$$

$$\text{normal form: } \mathbf{N} \cdot \mathbf{PX} = 0 \quad \text{or} \quad \mathbf{N} \cdot \mathbf{X} = \mathbf{N} \cdot \mathbf{P}$$

$$\text{general form: } ax + by + cz = d$$

$$\text{vector form: } \mathbf{X} = \mathbf{P} + s\mathbf{u} + t\mathbf{v}$$

$$\text{parametric form: } \begin{cases} x = p_1 + su_1 + tv_1 \\ y = p_2 + su_2 + tv_2 \\ z = p_3 + su_3 + tv_3 \end{cases}$$

$$\text{proj}_{\mathbf{u}} \mathbf{v} = \frac{\mathbf{u} \cdot \mathbf{v}}{\mathbf{u} \cdot \mathbf{u}} \mathbf{u}$$

$$R(\theta) = \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$$

$$c_{ij} = (-1)^{i+j} \det(A_{ij})$$

$$A^{-1} = \frac{1}{\det(A)} C^T = \frac{1}{\det(A)} \text{adj}(A)$$

$$\mathbf{x}_{LS} = (A^T A)^{-1} A^T \mathbf{b}$$