Equations

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Linear Algebra & Geometry

Dot Product - $\boldsymbol{v} \cdot \boldsymbol{w} := \sum_{i=1}^{n} v_i w_i, \quad \boldsymbol{v}$

Norm - $\|\boldsymbol{v}\| := \sqrt{\boldsymbol{v} \cdot \boldsymbol{v}} = \sqrt{\sum_{i=1}^{n} v_i^2},$

Angle Between Vectors - $cos(\theta) = \dfrac{\boldsymbol{v} \cdot \boldsymbol{w}}{\|\boldsymbol{v}\|\|\boldsymbol{w}\|}$

Modulus of Complex Numbers - $|z| := \sqrt{x^2 + y^2} = \sqrt{\bar{z}z}$

Euler's Formula - $e^{i\theta} = cos(\theta) + i.sin(\theta)$

de Moivre's Formula - $z^n = (cos(\theta) + i.sin(\theta))^n = cos(n\theta) + i.sin(n\theta)$

Leibniz Formula - $det(A) := \sum_{\sigma \in S_n} \left(sign(\sigma). \prod_{j=1}^{n} a_{\sigma(j),j} \right)$

Cramer's Rule - $x_j = \dfrac{det(A_j)}{det(A)}$

Cross Product - $\boldsymbol{x} \times \boldsymbol{y} := \begin{vmatrix} \boldsymbol{e}_1 & \boldsymbol{e}_2 & \boldsymbol{e}_3 \\ \boldsymbol{x}_1 & \boldsymbol{x}_2 & \boldsymbol{x}_3 \\ \boldsymbol{y}_1 & \boldsymbol{y}_2 & \boldsymbol{y}_3 \end{vmatrix}$

Calculus

Differentiable - $f'(x) := \lim_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$

Angle between Tangents - $\phi = \left| \dfrac{m_1 - m_2}{1 + m_1 m_2} \right|$

Taylor Series Polynomial - $T_n(x) = f(a) + (x-a)f'(a) + \cdots + \dfrac{1}{n}(x-a)^n f^n(a)$

Taylor Series Remainder - $R_n(x) = \dfrac{1}{n} \int_a^x (x-t)^n f^{(n+1)}(t) dt$

Curvature, Cartesian - $K(x) = \dfrac{|y''(x)|}{[1 + y'(x)^2]^{\frac{3}{2}}}$

Curvature, Parametric - $K(t_0) = \dfrac{y''(t_0)x'(t_0) - y'(t_0)x''(t_0)}{[x'(t_0)^2 + y'(t_0)^2]^{\frac{3}{2}}}$

Wronskian - $W[x, y] = \begin{vmatrix} x & y \\ x' & y' \end{vmatrix}$

Wronskian of Sequences - $W[x, y] = \begin{vmatrix} x_n & y_n \\ x_{n+1} & y_{n+1} \end{vmatrix}$

Directional Derivative - $D_{\boldsymbol{u}}\boldsymbol{f}(\boldsymbol{x}) := \boldsymbol{f}'(\boldsymbol{x}).\boldsymbol{u}$

Directional Derivative - $\nabla f(\boldsymbol{x}) := (f_{x_1}(\boldsymbol{x}), \dots, f_{x_d}(\boldsymbol{x}))$