

Formulas

$$\text{pr}_{\mathbf{v}} \mathbf{u} = \left(\frac{\mathbf{u} \cdot \mathbf{v}}{|\mathbf{v}|^2} \right) \mathbf{v}$$

$$s(t) = \int_a^t |\mathbf{v}(z)| dz$$

$$\mathbf{T} = \frac{\mathbf{v}}{|\mathbf{v}|}$$

$$\mathbf{N} = \frac{\mathbf{T}'}{|\mathbf{T}'|}$$

$$\mathbf{B} = \mathbf{T} \times \mathbf{N}$$

$$\kappa = \frac{|\mathbf{T}'|}{|\mathbf{v}|} = \frac{|\mathbf{v} \times \mathbf{a}|}{|\mathbf{v}|^3}$$

$$\kappa = \frac{|x'y'' - y'x''|}{[(x')^2 + (y')^2]^{3/2}}$$

$$\kappa = \frac{|y''|}{[1 + (y')^2]^{3/2}}$$

$$a_T = \mathbf{a} \cdot \mathbf{T} = s'' = \frac{\mathbf{v} \cdot \mathbf{a}}{|\mathbf{v}|}$$

$$a_N = \mathbf{a} \cdot \mathbf{N} = \kappa (s')^2 = \frac{|\mathbf{v} \times \mathbf{a}|}{|\mathbf{v}|}$$