

Vector Functions Calculus III – Chapter 10 Formulas

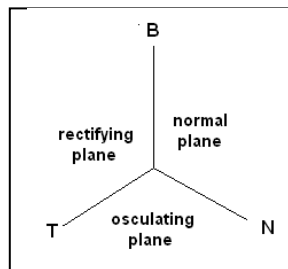
Vector Function is given as $r(t) = \langle f(t), g(t), h(t) \rangle = f(t)i + g(t)j + h(t)k$

Arclength: $L = \int_a^b |r'(t)| dt$

Unit Tangent Vector: $T(t) = \frac{r'(t)}{|r'(t)|}$

Curvature: $\kappa = \left| \frac{dT}{ds} \right|$ or $\kappa(t) = \frac{|T'(t)|}{|r'(t)|} = \frac{|r'(t) \times r''(t)|}{|r'(t)|^3}$ or $\kappa(x) = \frac{|f''(x)|}{|1 + f'(x)^2|^{3/2}}$

Normal Vector: $N = \frac{T'(t)}{|T'(t)|}$



Binormal Vector: $B = T(t) \times N(t)$

Normal plane determined by N and B

Osculating plane determined by T and N

Rectifying plane determined by T and B (not in text)

Parametric surfaces:

given vector function: $f(u, v) = x(u, v)i + y(u, v)j + z(u, v)k$

parametric surface is $(x, y, z) | x = x(u, v), y = y(u, v), z = z(u, v)$

parametric equations are $x = x(u, v) \quad y = y(u, v) \quad z = z(u, v)$

surfaces of revolution will include rotation around an axis indicated by θ , etc.