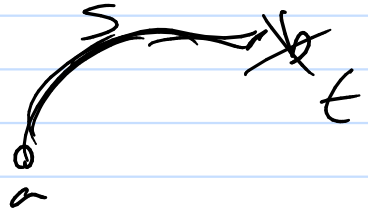
Math 344

HW? → Mark says: "5 or so pebs"

Layer: ① $s = \int_a^b |r'|\,dt$

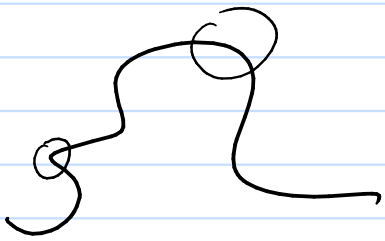


② $s(t) = \int_a^t |r'(u)|\,du$

by Fund. Th^{m} $\quad \frac{d}{dt}[s(t)] = |r'(t)|$

③ If you have $s = s(t)$ $\overset{\text{solve for } t}{\rightsquigarrow}$ $t = f(s)$

so $\boxed{r(t)} = r(f(s)) = \boxed{r(s)}$



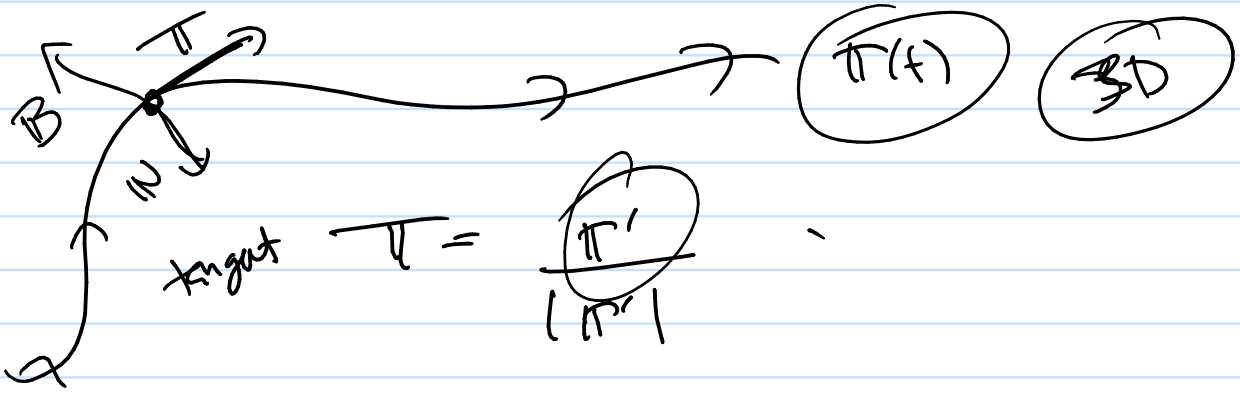
$B \propto dT$ $\qquad$ $B \propto \frac{1}{ds}$

Curvature $\qquad \kappa = \left| \frac{dT}{ds} \right|$ $\qquad$ $T = \frac{r'(t)}{|r'(t)|}$

$$\kappa(t) = \left| \frac{\frac{dT}{dt}}{\frac{ds}{dt}} \right| = \frac{|T'|}{|r'|}$$

Note: $\qquad r = \langle x, y, z \rangle$

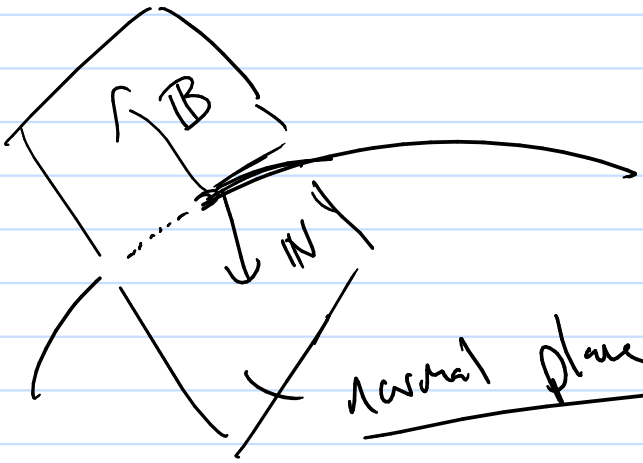
$$\kappa = \frac{|T'|}{|r'|} = \frac{|r' \times r''|}{|r'|^3}$$



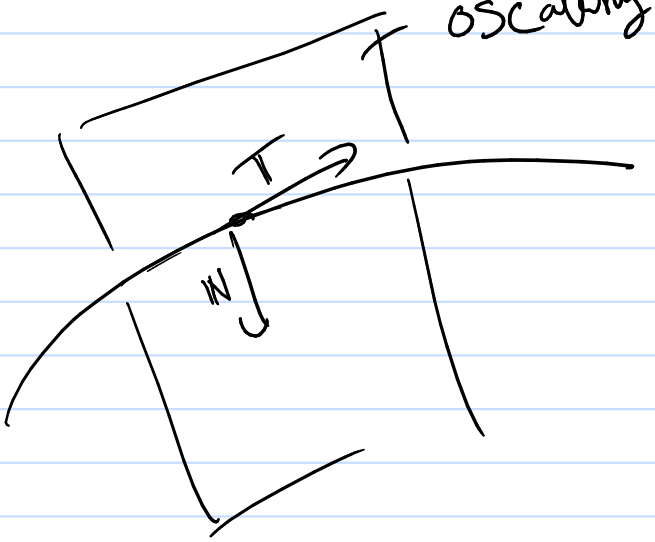
tangent $T = \dfrac{r'}{|r'|}$.

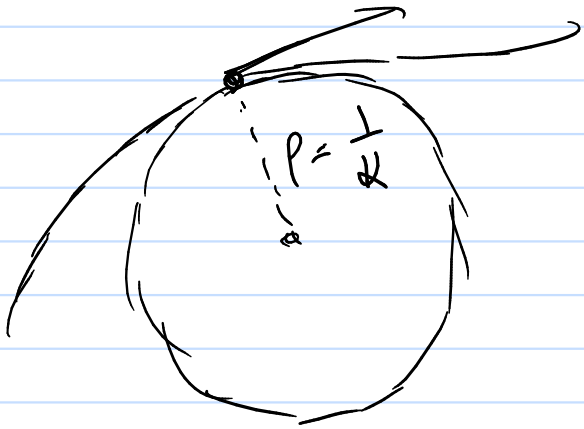
Normal $N = \dfrac{T'}{|T'|}$.

binormal $B = T \times N$.

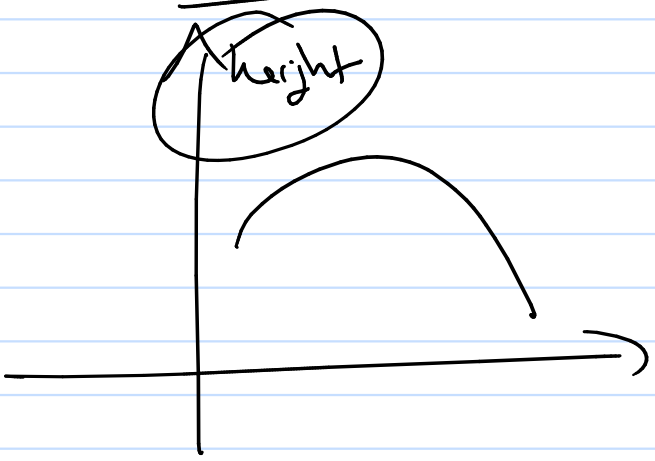


normal plane is $\perp$ to Tangent





13.4 Motion in Space



Calc I

position = $s(t)$

vel = $v(t) = s'(t)$

accel = $a(t) = v'(t)$
$= s''(t)$

Force = change in Momentum = $\frac{d}{dt}\{\text{mass} \cdot \text{vel}\}$

$F = ma$

$a = a(t)$

$v = \int a(t)\,dt$

$r = \int v(t)\,dt$

Monday: Review

Wed: 24 open for Exam.

Friday: "grade Exam 1"