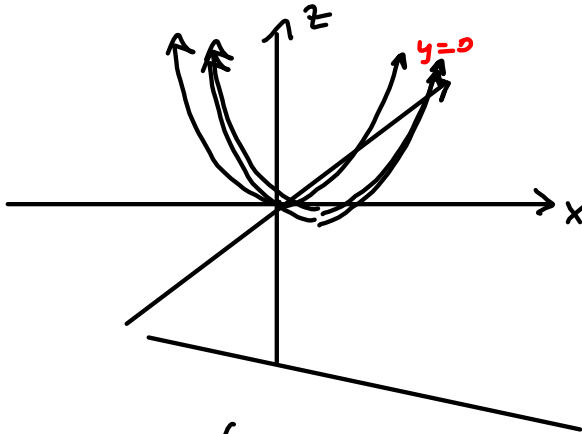


$$z = \frac{x^2}{a^2} - \frac{y^2}{b^2}$$

Fix $y = k$

$$z = \frac{x^2}{a^2} - \frac{k^2}{b^2} = \frac{x^2}{a^2} - C$$



$$y = 0$$

$$z = \frac{x^2}{a^2}$$

$$y = \pm 1$$

$$z = \frac{x^2}{a^2} - 1$$

Let $x = k$ (fixed)

$$z = \frac{k^2}{a^2} - \frac{y^2}{b^2}$$

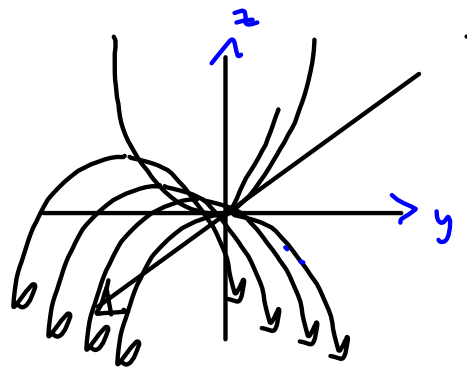
Fixed

$$x = 0$$

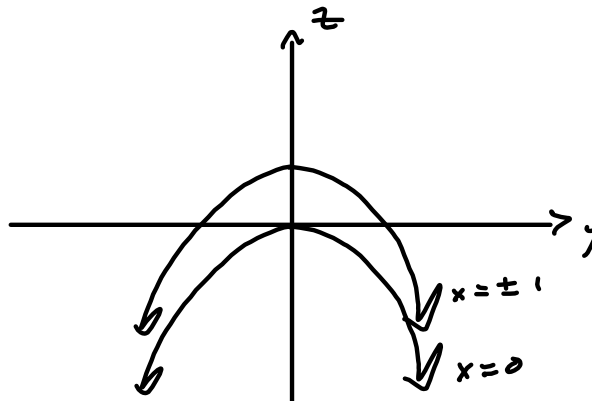
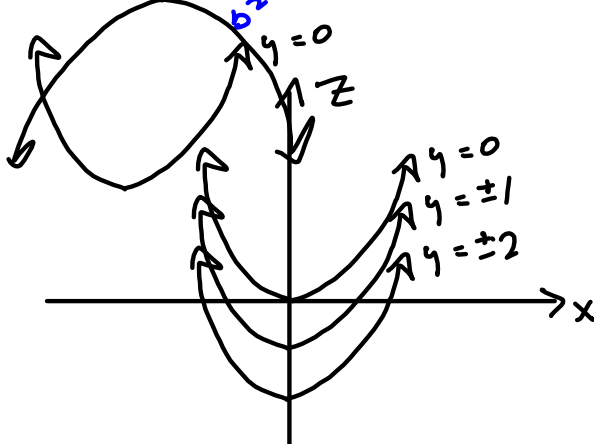
$$z = -\frac{y^2}{b^2}$$

$$x = \pm 1$$

$$z = -\frac{y^2}{b^2} + \text{bigger}$$



Slices / traces parallel to yz -plane, (i.e., $x = \text{constant}$)

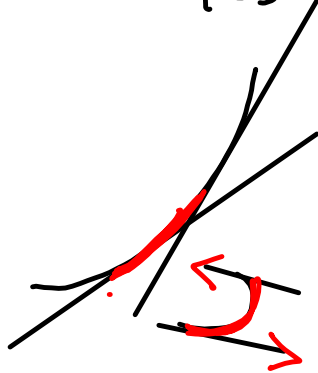


\bar{T} = unit tangent vector

$$= \frac{1}{|\bar{r}'|} \bar{r}'$$

Curvature :

$$\chi = \text{curvature} = \left| \frac{d\bar{T}}{ds} \right|$$



Assume $s = s(t)$ = arc length as a function of t

∴ s is an invertible function, so that $t = t(s)$ = 't of s'

Then $\left| \frac{d\bar{T}}{ds} \right| = \left| \frac{\frac{d\bar{T}}{dt}}{\frac{ds}{dt}} \right|$ *

Chain rule, viewing \bar{T} as func of t and t as func of s .

$\frac{d\bar{T}}{dt} = \frac{d\bar{T}}{ds} \cdot \frac{ds}{dt}$ (chain)

$$\chi(t) = \left| \frac{d\bar{T}}{ds} \right| = \left| \frac{\frac{d\bar{T}}{dt}}{\frac{ds}{dt}} \right| = \frac{|\bar{T}'(t)|}{|\bar{r}'(t)|}$$

(Red circles around $\frac{d\bar{T}}{dt}$ and $\frac{ds}{dt}$ in the denominator, with arrows pointing to the boxed fraction above. Red text "Can do" is written above the arrows.)

$$s = \int_a^b ds = \int_a^b \sqrt{f'^2 + g'^2 + h'^2} dt$$

(Red arrow from the boxed fraction above points to the integral, with red text "Can do" written above it.)

$\bar{r}' \times \bar{r}''$

$$= 1 \quad | \overline{r'} |^3 =$$

STUFF they left out of T10 proof.

"Since \overline{r} is \perp to \overline{r}' "

Why? \overline{r}' is of length 1

