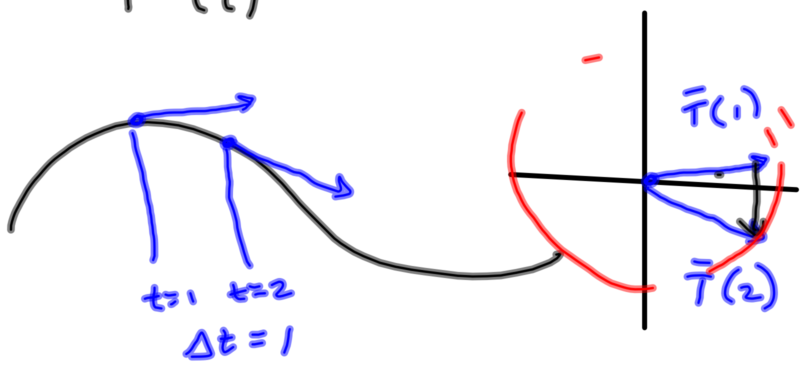
$$\frac{dy}{dx} \approx \frac{\Delta y}{\Delta x}$$

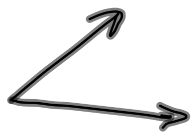
So, if $\Delta x = 1$, then $\frac{dy}{dx} \approx \Delta y$

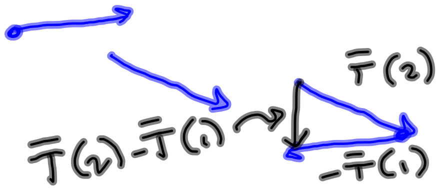
$\bar{T}'(t)$



$$\frac{\bar{T}(2) - T(1)}{1} \approx \bar{T}'(1)$$

$$\bar{T}(2) - \bar{T}(1) = \bar{T}(2) + \left(-\bar{T}(1)\right)$$



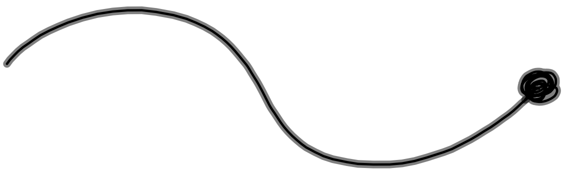


It approximates $\bar{T}'(t)$.

What ~~does~~ happens when $\bar{r}'(t) = \bar{0}$?

It stopped

Curvature meaningless.



§14.3
#4 ln cos t means ln(cos(t))
#7, 8 Maple / grapher.

$\boxed{\#12 \text{ Bonus}}$

Curvature $\kappa = \left|\frac{d\bar{T}}{ds}\right| = \left|\frac{\frac{d\bar{T}}{dt}}{\frac{ds}{dt}}\right|$

Great when we have a handy formula for s, $\bar{T}(s)$

$$\kappa = \frac{|\bar{T}'(t)|}{|s'(t)|} = \frac{|\bar{T}'(t)|}{|\bar{r}'(t)|} =$$

$$s(t) = \int_a^t \sqrt{(x'(u))^2 + (y'(u))^2 + (z'(u))^2}\, du$$

$$= \int_a^t |\bar{r}'(u)|\, du$$

$$\Longrightarrow s'(t) = |\bar{r}'(t)|$$

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

$\bar{r}' \times \bar{r}'' =$ Come back to this when Steve has his head on straight.

Read pg 840, up to The Normal and Binormal for the 2-D case.

Feb 8-12:33 PM

$\bar{a} \times \bar{b}$

$\langle 1,2,3 \rangle \times \langle -1,5,1 \rangle$

$\times \langle -1,5,1 \rangle$

$\langle -13,-4,7 \rangle$

$(2)(1) - 5(3)$

$-[(1)(1) - (-1)(3)]$

$-(1+3)$

$\langle 1,2,3\rangle \cdot \langle 4,5,6\rangle$

$= 4 + 10 + 18 = 32$

$\bar{a} \times \bar{b} = \langle -3, 6, -3\rangle$

$$\begin{array}{r} \langle 1,2,3\rangle \\ \times\ \langle 4,5,6\rangle \\ \hline \langle -3, 6, -3\rangle \end{array}$$

§ 13.5 #46

Ken

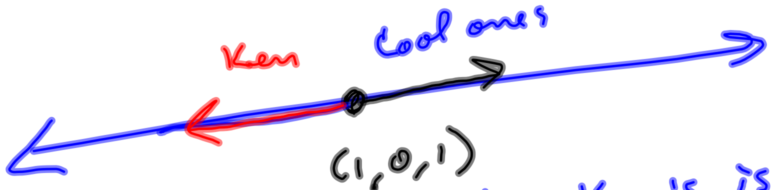
line thru (1, 0, 1) & (4, −2, 2)

int. $x+y+z=6$?

Direction vector for $\mathcal{L}$ is $\langle 3, -2, 1\rangle$

Ken did $\langle -3, 2, -1\rangle$

$x = 1-3t,\ y = 2t,\ z = 1-t$



Doesn't matter. Ken's is parallel to ours.

same direction only opposite.

$$1-3t+2t+1-t=6$$
$$-2t+2=6$$
$$-2t=4$$
$$t=-2$$
$$x = 1-3(-2) = 1+6 = 7$$
$$y = 2(-2) = -4$$
$$z = 1-(-2) = 3$$

$(7, -4, 3)$

Feb 8-12:55 PM

$x+y+z=1$ $\quad x+z=0$ $\quad$ 13.5 #12

Find line of intersection

$\bar{n}_1 = \langle 1,1,1\rangle$

$\bar{n}_2 = \langle 1,0,1\rangle$

$\bar{n}_1 \times \bar{n}_2 =$

$x=-z$

$-z+y+z=1$

$y=1$

$z=$ anything.

z is free.

1 degree of freedom.

Let $t=z$

$\boxed{x=-t,\ y=1,\ z=t}$

$$\begin{array}{r} \langle 1,1,1\rangle \\ \times\ \langle 1,0,1\rangle \\ \hline \langle 1,0,-1\rangle \end{array}$$

is direction vector for the line.

Find one pt on it.

Let $z=0 \Rightarrow$

$x+z = x+0 = 0 \Rightarrow x=0$

$x=0,\ z=0 \Rightarrow$

$x+y+z = 0+y+0 = 1$

$y=1$

$(0,1,0)$ on it.

$x = 0+1t$

$y=1$

$z=0-t$

$x+y+z=1$

$x+z=0$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 1 \\ 1 & 0 & 1 & 0 \end{array}\right] \sim \left[\begin{array}{ccc|c} 1 & 1 & 1 & 1 \\ 0 & -1 & 0 & -1 \end{array}\right]$$

Reduced Row Echelon Form.

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 \end{array}\right] \sim \left[\begin{array}{ccc|c} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{array}\right]$$

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & a \\ 0 & 1 & 0 & b \\ 0 & 0 & 1 & c \end{array}\right]$$

$x+z=0$

$y=1$

Let z be free

$x=-z=-t$

$y=1=1$

$z=z=t$

$x=-t$

$y=1$

$z=t$