Math 344

Q's

Homework

$0 \le t \le \pi$

13.1 $x = 3\sin(t)$ $y = 3\cos(t)$ 2D

ch 13 Vector functions

$t \in \mathbb{R}$ $\in$ element of

$\mathbb{R}$ all reals

$\mathbb{Q}$ all rationals

$0.12112111211112\ldots$

Vector function

$\Leftrightarrow$

Vector

$\|\vec{r}\| = 1$?

$\vec{r}(t) = \langle x(t), y(t), z(t) \rangle$ 3D

nD $\vec{r}(t) = \langle x_1(t), x_2(t), \ldots, x_n(t) \rangle$

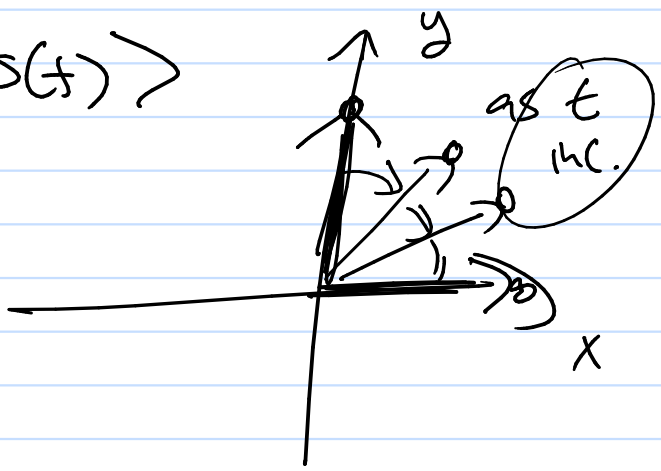
$\vec{r}(t) = \langle 3\sin(t), 3\cos(t) \rangle$

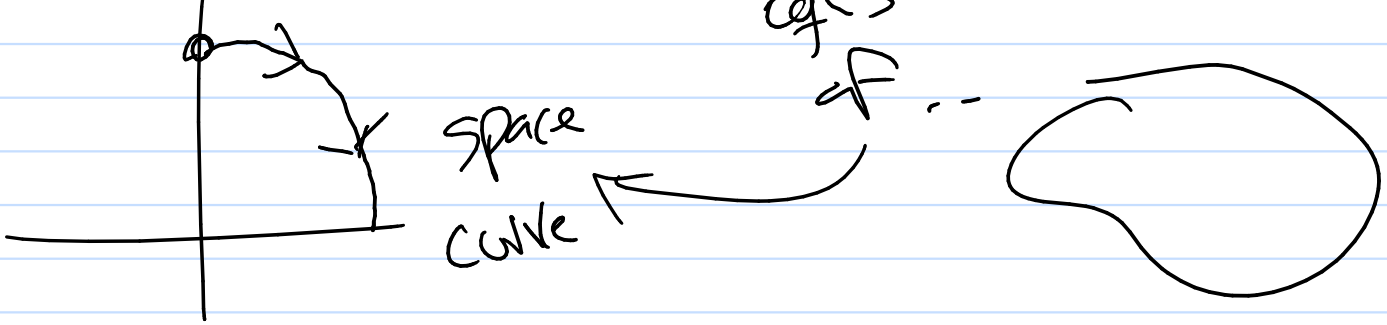
2D

$x = x(t) = 3\sin(t)$

$y = y(t) = 3\cos(t)$

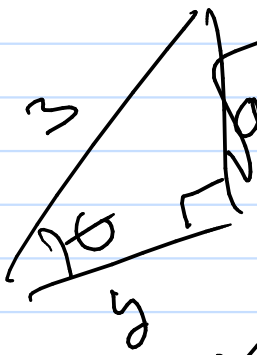
parametric eqns of ... space curve





"physical"

Note: $y = x^2 + 1$ is 3



$y = \sin(x)$ is 3

$x = 3\sin(t)$ $\qquad$ $y = 3\cos(t)$

$x = 3\sin\left(\cos^{-1}\left(\frac{y}{3}\right)\right)$

$t = \cos^{-1}\left(\frac{y}{3}\right)$

$x = 3\sqrt{\frac{9-y^2}{1}}$ $\qquad$ $x^2 + y^2 = 9$

Space curves (plot)

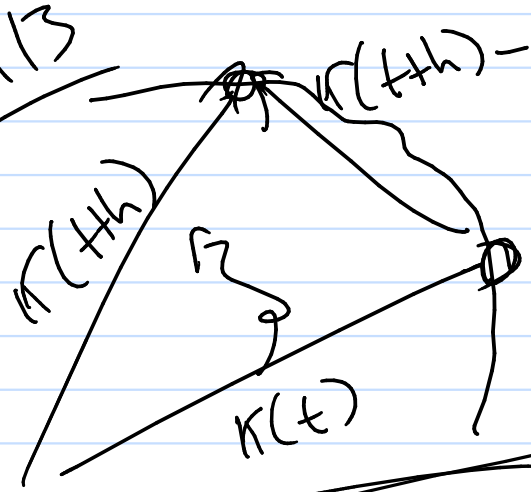
↖ geogebra.org

Curve(x(t), y(t), z(t), t, a, b)

& ⟨ x(t), y(t), z(t) ⟩ over $a \le t \le b$

Calculus on $\vec{r}(t)$

Ch13

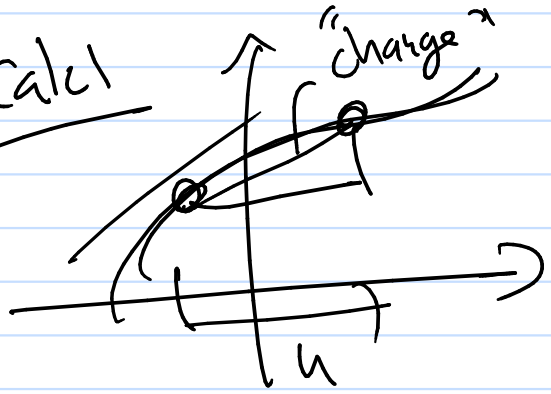


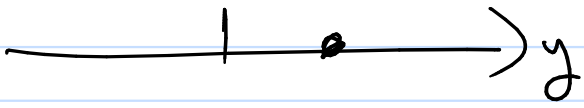
$$\lim_{h \to 0} \frac{\vec{r}(t-h) - \vec{r}(t)}{h}$$

tangent

r(t)

Calc I





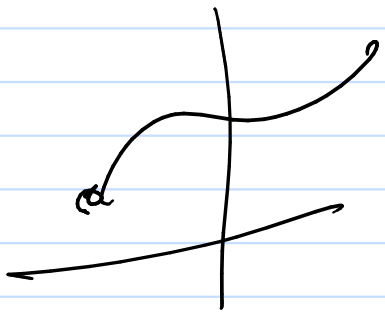
$$\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$\lim_{t\to a} \vec{r}(t) = \lim_{t\to a} \langle x(t), y(t), z(t) \rangle$$

$$= \left\langle \lim_{t\to a} x(t), \lim_{t\to a} y(t), \lim_{t\to a} z(t) \right\rangle$$

Note: Cont. (& calc I)

$$\lim_{x\to a} f(x) = f(a)$$



ch 13 cont $\lim_{t\to a} \vec{r}(t) = \vec{r}(a)$