Funções Vetorial

Aplicação $\mathbb{R} \to \mathbb{R}^n$ c/ $n > 1$.

$$\vec{r}(t) = \langle t, t^2, t^3 \rangle$$

Funções
Componentes

$g(t) = t$
$h(t) = t$
$\ell(t) = t^3$

$$\vec{r}(t) = \langle g(t), h(t), \ell(t) \rangle$$

Produto vetorial

$$\vec{a} = 4\hat{i} + 3\hat{k}$$
$$\vec{b} = 5\hat{i} + 2\hat{j} + 3\hat{k}$$

$$\vec{a} \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 4 & 0 & 3 \\ 5 & 2 & 3 \end{vmatrix} \begin{matrix} \hat{i} & \hat{j} \\ 4 & 0 \\ 5 & 2 \end{matrix}$$

$$= 0\hat{k}^2 - 6\hat{i} - 12\hat{j} + 0\hat{i}^2 + 15\hat{j} + 8\hat{k}$$

$$= (-6)\hat{i} + (15 - 12)\hat{j} + (0 + 8)\hat{k}$$

$$= -6\hat{i} + 3\hat{j} + 8\hat{k}$$

$$\vec{a}(t) = 4t\,\hat{\imath} + 3t\,\hat{k}$$

$$\vec{b}(t) = \cos(t)\,\hat{\imath} + \tan(t^2)\,\hat{\jmath} + 4\,\hat{k}$$

$$\vec{a} + \vec{b} = (4t + \cos t)\,\hat{\imath} + \tan(t^2)\,\hat{\jmath} + (3t + 4)\,\hat{k}$$

$$\vec{a} \circ \vec{b} = 4t\cos t + 12t$$

$$\vec{a} \times \vec{b} = \begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ 4t & 0 & 3t \\ \cos t & \tan t^2 & 4 \end{vmatrix} \begin{matrix} \hat{\imath} & \hat{\jmath} \\ 4t & 0 \\ \cos t & \tan t^2 \end{matrix}$$

$$-3t\tan t^2\,\hat{\imath} - 16t\,\hat{\jmath} \quad + 3t\cos t\,\hat{\jmath} + 4t\tan t^2\,\hat{k}$$

$$= (-3t\tan t^2)\,\hat{\imath} + (3t\cos t - 16t)\,\hat{\jmath} + (4t\tan t^2)\,\hat{k}$$

Exemplo de função vetorial
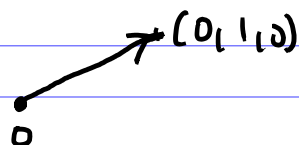
$$R \rightarrow R^{10}$$

$$\vec{V}(t) = \langle \text{inflação}(t),\ \text{dólar}(t),\ \text{IBV}(t),\ \text{IPCA}(t),\ \cdots \rangle$$

$$\vec{r}(t) = \langle t,\ t + 1,\ t^2 \rangle$$

$$\vec{r}(0) = \langle 0,\ 1, 0 \rangle \quad \boxed{P(0,1,0)}$$

$$\vec{r}(1) = \langle 1, 2, 1 \rangle$$

$$\vec{r}(2) = \langle 2, 3, 4 \rangle$$

$$X = \cos t$$
$$Y = \text{sen}\, t$$

$$\langle \cos t, \text{sen}\, t, 0 \rangle$$

$$\sqrt{\cos^2 t + \text{sen}^2 t + 0^2} =$$

$$\sqrt{1}$$

$$\boxed{x^2 + y^2 = 1}$$

$$\cos^2 t + \text{sen}^2 t = 1$$
$$\boxed{x^2 + y^2 = 1}$$

$$X = \cos t$$
$$Y = \text{sen}\, t$$
$$Z = t$$

$$X = \cos(Z)$$