MAT2454 - Cálculo Diferencial e Integral para Engenharia II

Mais algumas respostas da 1ª lista de exercícios - 2012

19. (a) $\gamma : \mathbb{R} \to \mathbb{R}^2, \gamma(t) = (t, \frac{1}{2}(1-t))$

Reta tangente: $X = (\frac{1}{2}, \frac{1}{4}) + \lambda(2, -1), \lambda \in \mathbb{R}$

(b) $\gamma : [-\frac{\pi}{2}, \frac{\pi}{2}] \to \mathbb{R}^2, \gamma(t) = (5 + \cos(t), \frac{1}{\sqrt{2}} \operatorname{sen}(t))$

Reta tangente: $X = (6, 0) + \lambda(1, 0), \lambda \in \mathbb{R}$

(c) $\gamma_1 :]-\frac{\pi}{2}, \frac{\pi}{2}[\to \mathbb{R}^2, \gamma_1(t) = (\sec(t), \operatorname{tg}(t))$ parametriza um ramo da hipérbole

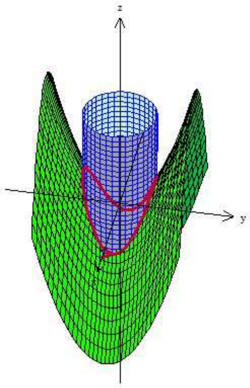
e

$\gamma_2 :]\frac{\pi}{2}, \frac{3\pi}{2}[\to \mathbb{R}^2, \gamma_2(t) = (\sec(t), \operatorname{tg}(t))$ parametriza o outro ramo.

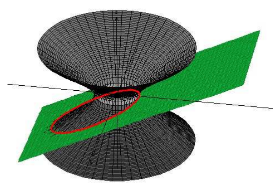
Reta tangente: $X = (\sqrt{2}, 1) + \lambda(\sqrt{2}, 1), \lambda \in \mathbb{R}$

20.

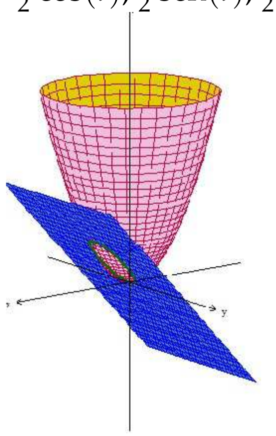
(a) $\gamma : [0, 2\pi[\to \mathbb{R}^3,$
$\gamma(t) = (\cos(t), \operatorname{sen}(t), -\cos(2t))$



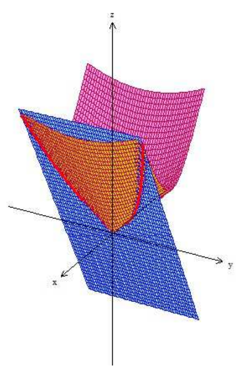
(b) $\gamma : [0, 2\pi[\to \mathbb{R}^3,$
$\gamma(t) = (\sqrt{2}\cos(t), 2\operatorname{sen}(t) - 1, \operatorname{sen}(t) - 1)$



(c) $\gamma : [0, 2\pi[\to \mathbb{R}^3,$
$\gamma(t) = (\frac{1}{2} + \frac{1}{2}\cos(t), \frac{1}{2}\operatorname{sen}(t), \frac{1}{2} + \frac{1}{2}\cos(t))$



(d) $\gamma : \mathbb{R} \to \mathbb{R}^3,$
$\gamma(t) = (\frac{1}{4}(t^2 - 1), t, \frac{1}{2}(t^2 + 1))$

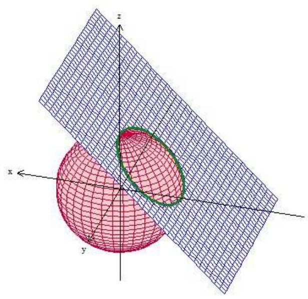


21.

(a) $\gamma : [0, 2\pi[\to \mathbb{R}^3, \gamma(t) = (\frac{1}{2}(\cos(t) - 1), \frac{1}{\sqrt{2}}\,\text{sen}(t), \frac{1}{2}(\cos(t) + 1))$

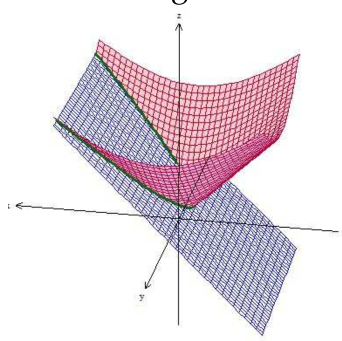
Nessa parametrização, $\gamma(\frac{\pi}{2}) = (-\frac{1}{2}, \frac{\sqrt{2}}{2}, \frac{1}{2})$, assim o vetor tangente à trajetória de γ nesse ponto é paralelo a $\overrightarrow{\gamma}'(\frac{\pi}{2})$.

Reta tangente: $X = (-\frac{1}{2}, \frac{\sqrt{2}}{2}, \frac{1}{2}) + \lambda(-1, 0, -1), \lambda \in \mathbb{R}$



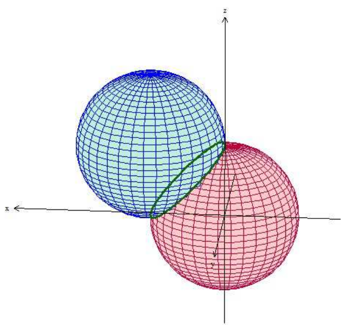
(b) $\gamma : \mathbb{R} \to \mathbb{R}^3, \gamma(t) = (\frac{1}{2}(t^2 - 1), t, \frac{1}{2}(t^2 + 1))$

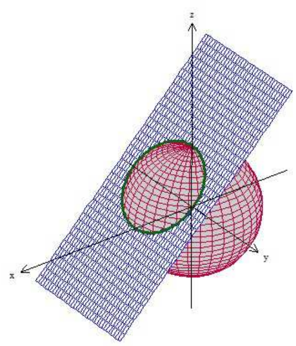
Reta tangente: $X = (0, 1, 1) + \lambda(1, 1, 1), \lambda \in \mathbb{R}$



(c) $\gamma : [0, 2\pi[\to \mathbb{R}^3, \gamma(t) = (\frac{1}{2}(1 - \cos(t)), \frac{1}{\sqrt{2}}\,\text{sen}(t), \frac{1}{2}(\cos(t) + 1))$

Reta tangente: $X = (\frac{1}{2}, \frac{\sqrt{2}}{2}, \frac{1}{2}) + \lambda(1, 0, -1), \lambda \in \mathbb{R}$





22. Veja a solução na P1 de 2009.