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13.2

25) $r(t) = (e^{-t} \cdot \cos(t),\ e^{-t}\,\text{sen}(t),\ e^{-t})$

• Executando as derivadas:

$x' = -e^{-t} \cdot \cos(t) + e^{-t}(-\text{sen}(t))$

$x' = e^{-t} \cdot \cos(t) - e^{-t}\,\text{sen}(t) = e^{-t}(\cos(t) - \text{sen}(t))$

$y' = -e^{-t}\,\text{sen}(t) + e^{-t} \cdot \cos(t)$

$y' = -e^{-t}(\text{sen}(t) - \cos(t)$

$z' = \frac{d}{dt} e^{-t}$ $\qquad f = e^u,\ u = t$

$z' = \frac{d}{du}(e^u) \cdot \frac{d}{dt}(-t)$

$z' = e^{-t} \cdot \frac{d}{dt}(-t) = e^{-t} \cdot -1 = -e^{-t}$

$r'(t) = -e^{t}(\text{sen}(t) + \cos(t)),\ -e^{-t}(\text{sen}(t) - \cos(t),\ -e^{-t})$

• Igualando a curva ao ponto $(1,0,1)$

$$\begin{cases} 1 = e^{-t} \cdot \cos(t) \\ 0 = e^{-t} \cdot \text{sen}(t) \\ 1 = e^{-t} \end{cases}$$

• Tomando apenas a equação $1 = e^{t}$, temos que $t = 0$

• Dessa forma podemos calcular $r'(0)$ para encontrar o vetor tangente:

$r'(0) = (-e^0(\text{sen}(0) + \cos(0)),\ -e^0(\text{sen}(0) - \cos(0),\ -e^0)$

$r'(0) = (-1, 1, -1)$

• Sendo assim temos as equações:

$x = 1 + (-1)t \quad ; \quad y = 0 + t \quad ; \quad z = 1 + (-1) \cdot t$

$x = 1 - t \qquad y = t \qquad z = 1 - t$