3) $c(t) = \left(2t^{3/2}, \cos(2t), \operatorname{sen}(2t)\right)$

$$\text{long} = \int_a^b \sqrt{x'^2 + y'^2 + z'^2}\, dt$$

$$x' = (2t^{3/2})' = 3\sqrt{t}$$

$$y' = (\cos(2t))' = -2\operatorname{sen}(2t)$$

$$z' = (\operatorname{sen}(2t)) = 2\cos(2t)$$

$$\text{Long} = \int_{-4/9}^{1/3} \sqrt{(3\sqrt{t})^2 + (-2\operatorname{sen}(2t))^2 + (2\cos 2t)^2}\, dt$$

$$\int_{-4/9}^{1/3} \sqrt{9t + 4\operatorname{sen}^2(2t) + 4\cos^2(2t)}$$

$$\int_{-4/9}^{1/3} \sqrt{9t + 4(\underbrace{\cos^2(2t) + \operatorname{sen}^2(2t)}_{\Rightarrow 1}}\, dt$$

$$\int_{-4/9}^{1/3} \sqrt{9t + 4}\, dt \Rightarrow 1{,}37. //$$

4) $R(t) = t\cos(t)\hat{i} - \frac{\operatorname{sen} t}{2}\hat{j} + \sqrt{e^t}\,\hat{k}$

$P(0,0,1)$

$t=0$

$x' = (t\cos t)' = \cos(t) - T\operatorname{sen}(t) \Rightarrow x = 1$

$y' = \left(\frac{-\operatorname{sen} t}{2}\right)' = \frac{-\cos t}{2} \Rightarrow y = -1/2$

$z' = \left(\sqrt{e^t}\right)' = \frac{\sqrt{e^t}}{2} \Rightarrow z = 1/2$

$P(0,0,1)$

$\Rightarrow x \to 0 = t\cos t \quad t = 0 \lor \cos t = 0$

$y \Rightarrow \frac{-\operatorname{sen} t}{2} = 0 \quad t = 2\pi n \to t = 0$

$z \Rightarrow \sqrt{e^t} = \underline{1}$

$e^t = 1 \quad T = 0$

$$r(t)\begin{cases} x = 0 + t \cdot 1 \\ y = 0 + t \cdot -1/2 \\ z = 1 + t \cdot 1/2 \end{cases}$$