TESTE 1

Raquel Temóteo Eucaria Pereira da Costa   ①
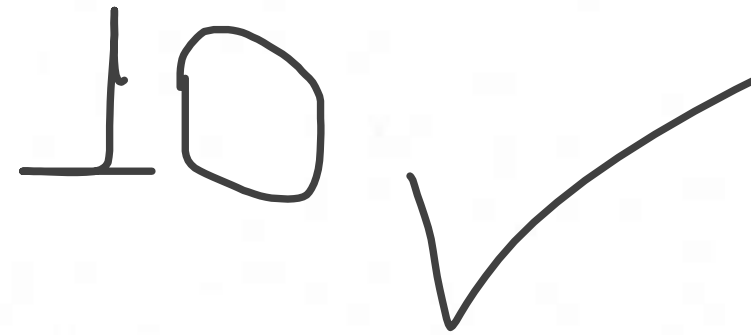202045268   - Cálculo 2 Turma C

① a)

$R\dot{q}(t) + C.q(t) = E$

$(sen(t) + 2t + 1).q'(t) + (cos(t) + 2).q(t) = 12$

$$\boxed{q'(t) + \frac{(cos(t) + 2)}{sen(t) + 2t + 1} . q(t) = \frac{12}{sen(t) + 2t + 1}}$$

b)

$P(t) = \int P(t) . dt$

$P(t) = \int \frac{cos(t) + 2}{sen(t) + 2t + 1} dt \rightarrow \int \frac{1}{u} . du \rightarrow \boxed{ln(sen(t) + 2t + 1) + A}$

$u = sen(t) + 2t + 1$
$du = cos(t) + 2$

$e^{P(t)} = e^{ln(sen(t) + 2t + 1)} = \boxed{sen(t) + 2t + 1}$ $\Big|$ $e^{-P(t)} = \boxed{\frac{1}{sen(t) + 2t + 1}}$

c)

$C(t) = \int g(t) . e^{P(t)} \rightarrow \int \frac{12}{(sen(t) + 2t + 1)} . (sen(t) + 2t + 1). dt \rightarrow \int 12 . dt \rightarrow 12t + B$

$V(t) = C(t) . e^{-P(t)} \rightarrow 12t + B \left(\frac{1}{sen(t) + 2t + 1} \right) \rightarrow \boxed{\frac{12t}{sen(t) + 2t + 1} + \frac{B}{sen(t) + 2t + 1}}$

d)

$q(0) = q_0$

$\frac{12 . 0}{sen(0) + 2.0 + 1} + \frac{B}{sen(0) . 2.0 + 1} = q_0 \rightarrow \boxed{B = q_0}$

$$q(t) = \frac{12t}{\text{sen}(t) + 2t + 1} + \frac{70}{\text{sen}(t) + 2t + 1}$$

$$\lim_{t \to \infty} \frac{12t}{\text{sen}(t) + 2t + 1} + \frac{70}{\text{sen}(t) + 2t + 1} \cdot \frac{}{(1/t)} = \frac{12}{2} = \boxed{6}$$

$$q(t) = \frac{12t}{\text{sen}(t) + 2t + 1} + \frac{70}{\text{sen}(t) + 2t + 1}$$