01 ⇝ $x(t) = te^{-t^2}$ Isaac Freitas.

$$Ex = \int_{-\infty}^{\infty} x(t)^2 \, dt$$

$$Ex = \int_{-\infty}^{\infty} te^{-t^2} \, dt \Rightarrow Ex = 0,3133$$

02 ⇝ $Py(t) = 1 + \frac{3^2}{2} + \frac{5^2}{2} + \frac{2^2}{2} = 1 + 2 + 4,5 + 12,5 = 20$ //

03 ⇝ $z(t) = 3x\left(\frac{t}{2} - 2\right)$

$$Ez = 3 \cdot Ex \cdot 2 \Rightarrow Ez = 5,6399$$ //

04 - A entrada aplicada ao sistema resultará em uma saída também limitada. Sendo assim, a afirmativa é verdadeira.

$05 \rightsquigarrow (D^2 + 5D + 4)\, y(t) = (D + 2)\, u(t)$

$\Delta = 9 \quad \therefore \quad \dfrac{-5 \pm 3}{2} \qquad \begin{aligned} x' &= -1 \\ x'' &= -4 \end{aligned}$

$y_0(0) = Ae^{-t} + Be^{-4t} = 0$

$y_0'(0) = -Ae^{-t} - 4Be^{-4t} = 2$

$-3B = 2$

$B = \dfrac{-2}{3} \rightsquigarrow \boxed{A = \dfrac{-2}{3} \;//}$

06 b)

$$\frac{x - V_c}{R} = C\frac{V_c}{dt} + \frac{1}{L}\int V_c \, dt$$

$$RCD^2 V_c + D v_c + \frac{R}{L} V_c = D x(t)$$

$$\left(D^2 + \frac{1}{RC}D + \frac{1}{LC}\right) V_c(t) = D x(t) \frac{1}{RC}$$

$$\left(D^2 + \frac{D}{RC} + \frac{1}{LC}\right) y(t) = \left(\frac{D}{R}^2 + \frac{1}{RLC}\right) x(t)$$

$$\left(2D^2 + 3D + 6\right) y(t) = \left(D^2 + 3\right) x(t)$$

$$6y = 0 + 3 \cdot 1$$

$$6y = 3$$

$$y' = \frac{3}{6} = \boxed{\frac{1}{2}}$$

6.2

07) $y(t) = \frac{1}{2} + e^{\frac{3}{4}t}\left(A\cos\left(\frac{\sqrt{3}}{4}t\right) + B\,\text{sen}\left(\frac{\sqrt{3}}{4}t\right)\right)$

$y(0) = 1 = \frac{1}{2}\left(1A + 0 \cdot B\right) \Rightarrow \boxed{A = \frac{1}{2}}$

$y'(0) = 0 = -\frac{1}{2}\,\text{sen}(0) + B\cos(0)$

$B \cdot \cos(0) = 0 \Rightarrow B = 0$

$y(t) = \frac{1}{2} e^{\frac{3}{4}t}\left(\frac{1}{2} \cdot \cos\left(\frac{\sqrt{3}}{4}t\right)\right)$ //

8) $\boxed{f_c = \frac{1}{T_h}}$ Logo

$0{,}1\,\mu s = 1\,\text{Mbps}$ //

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