Problema A.

Obtenga G(z) por el método de la integral de convolucion:

$$G(s) = \frac{2s+2}{(s^2 + \frac{[2]s}{10} - 1)(s-1)}$$

Polos simples	**Polo simple de orden n**
$K_j = \lim_{s \to s_j}\left[(s-s_j)\frac{X(s)z}{z-e^{Ts}}\right]$	$K_i = \frac{1}{(n_i-1)!}\lim_{s \to s_i}\frac{d^{n_i-1}}{ds^{n_i-1}}\left[(s-s_i)^{n_i}\frac{X(s)z}{z-e^{Ts}}\right]$

$$K_1 = \lim_{s \to 1}\left[(s-1)\left[\frac{2s+2}{(s^2+\frac{2s}{10}-1)(s-1)}\right]\frac{z}{z-e^{Ts}}\right]$$

$$K_1 = \lim_{s \to 1}\left[\frac{2s+2}{(s^2+\frac{2s}{10}-1)}\frac{z}{z-e^{Ts}}\right]$$

$$K_1 = \frac{2[1]+2}{([1]^2+\frac{2[1]}{10}-1)}\frac{z}{z-e^{T[1]}}$$

$$K_1 = \frac{4}{(1+\frac{2}{10}-1)}\frac{z}{z-e^{T}}$$

$$\boxed{K_1 = 20\frac{z}{z-e^{T}}}$$

Obteniendo las raíces de : $(s^2+\frac{[2]s}{10}-1)$ para saber si son polos simples o complejos:

$$s_{1,2} = \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{-(\frac{2}{10}) \pm \sqrt{(\frac{2}{10})^2 - 4(1)(-1)}}{2(1)}$$

$$s_{1,2} = \frac{-(\frac{2}{10}) \pm \sqrt{(\frac{2}{10})^2 - 4(1)(-1)}}{2(1)} = \frac{-(\frac{2}{10}) \pm \sqrt{(\frac{4}{100})+4}}{2(1)}$$

$$s_{1,2} = \frac{-(\frac{2}{10}) \pm \sqrt{(\frac{4}{100}) + \frac{400}{100}}}{2(1)} = \frac{-(\frac{2}{10}) \pm \sqrt{\frac{404}{100}}}{2(1)}$$

$$s_{1,2} = \frac{-(\frac{2}{10}) \pm \sqrt{(\frac{4}{100}) + \frac{400}{100}}}{2(1)} = \frac{-(\frac{2}{10}) \pm \sqrt{\frac{404}{100}}}{2(1)}$$

$s_1 = 0.90499$

$s_2 = -1.10499$ polos simples

$$K_2 = \lim_{s \to 0.90499} \left[(s - 0.90499) \left[\frac{2s+2}{(s-0.90499)(s+1.10499)(s-1)} \right] \frac{z}{z - e^{Ts}} \right]$$

$$K_2 = \lim_{s \to 0.90499} \left[\left[\frac{2s+2}{(s+1.10499)(s-1)} \right] \frac{z}{z - e^{Ts}} \right]$$

$$K_2 = \left[\frac{2[0.90499]+2}{([0.90499]+1.10499)([0.90499]-1)} \right] \frac{z}{z - e^{0.90499T}}$$

$$K_2 = \left[\frac{3.8082}{(2.00998)(-0.09501)} \right] \frac{z}{z - e^{0.90499T}}$$

$$K_2 = \left[\frac{3.8082}{-0.190968} \right] \frac{z}{z - e^{0.90499T}}$$

$$\boxed{K_2 = -19.9415 \frac{z}{z - e^{0.90499T}}}$$

$$K_3 = \lim_{s \to -1.10499} \left[(s + 1.10499) \left[\frac{2s+2}{(s+1.10499)(s-0.90499)(s-1)} \right] \frac{z}{z - e^{Ts}} \right]$$

$$K_3 = \lim_{s \to -1.10499} \left[\left[\frac{2s+2}{(s-0.90499)(s-1)} \right] \frac{z}{z - e^{Ts}} \right]$$

$$K_3 = \left[\frac{2[-1.10499]+2}{([-1.10499]-0.90499)([-1.10499]-1)} \right] \frac{z}{z - e^{T[-1.10499]}}$$

$$K_3 = \left[\frac{-0.20998}{(-2.00998)(-2.10499)} \right] \frac{z}{z - e^{-1.10499T}}$$

$$\boxed{K_3 = -0.049629 \frac{z}{z - e^{-1.10499T}}}$$

G(z)=

$$20\frac{z}{z-e^{T}}+-19.9415\frac{z}{z-e^{0.90499T}}+\boxed{-0.049629\frac{z}{z-e^{-1.10499T}}}$$