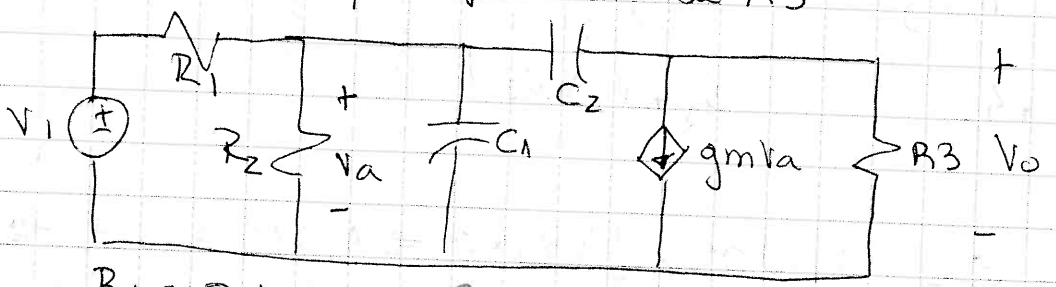
Para la red de la figura, que es lineal e invariante, determine V_o y la potencia de $R3$



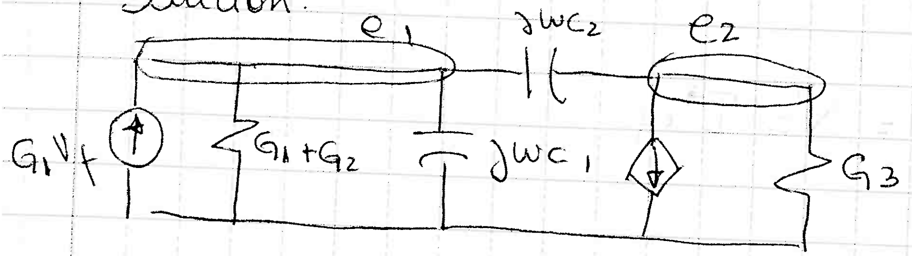
$R_1 = 0{,}1\ \Omega$ $\quad C_2 = 3F$

$R_2 = 0{,}5\ \Omega$ $\quad g_m = 40\ A/V$

$R_3 = 1\ \Omega$ $\quad V_f = \cos(t)$

$C_1 = 100F$

Solución:



$$\begin{bmatrix} G_1+G_2+jw(C_1+C_2) & -jwC_2 \\ -jwC_2 & jwC_2+G_3 \end{bmatrix}\begin{pmatrix} e_1 \\ e_2 \end{pmatrix} = \begin{pmatrix} G_1V_f \\ -g_mV_a \end{pmatrix}$$

Tenemos que $V_a = e_1 \Rightarrow -g_mV_a = g_m e_1$

$\Rightarrow$ introduzco en la matriz:

$$\begin{bmatrix} G_1+G_2+jw(C_1+C_2) & -jwC_2 \\ -jwC_2+g_m & G_3+jwC_2 \end{bmatrix}\begin{pmatrix} e_1 \\ e_2 \end{pmatrix} = \begin{pmatrix} G_1V_f \\ 0 \end{pmatrix}$$

Dando valores

$$\begin{bmatrix} 12 + 103j & -3j \\ -3j + 40 & 3j + 1 \end{bmatrix} \begin{pmatrix} e_1 \\ e_2 \end{pmatrix} = \begin{pmatrix} 10 \\ 0 \end{pmatrix}$$

$$\Rightarrow e_2 = 1{,}0356 \angle 37{,}63 \Rightarrow$$

$$V_0 = 1{,}0356 \cos(t + 0{,}65)$$

$$P = \frac{V^2}{2R_3} = 0{,}335 \text{ W}$$

Recuerden!!

$$P = \frac{V I^*}{2} = V_{ef} I^*_{ef}$$

$$P = \frac{V}{2}\left(\frac{V}{Z}\right)^*$$

$$P = \frac{|V|^2}{2Z^*} = \frac{|V_{ef}|^2}{Z^*}$$