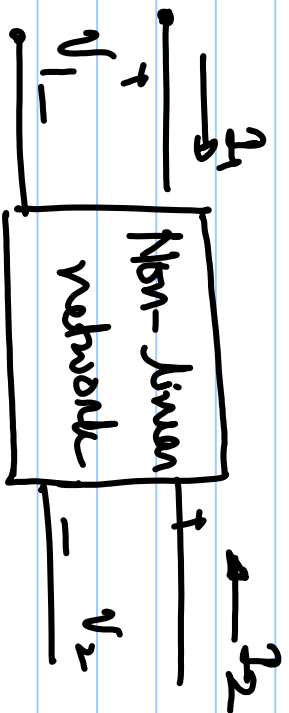


Problem Set 2 (b)

Note Title

24-01-2023

1



Sketch the two port incremental y -parameter network for the network in the figure having the following i - v characteristics.

$$a) \quad \begin{cases} i_1 = 0 & \text{for all } v_1, v_2 \\ i_2 = \beta v_1^2 & \text{when } v_1 \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

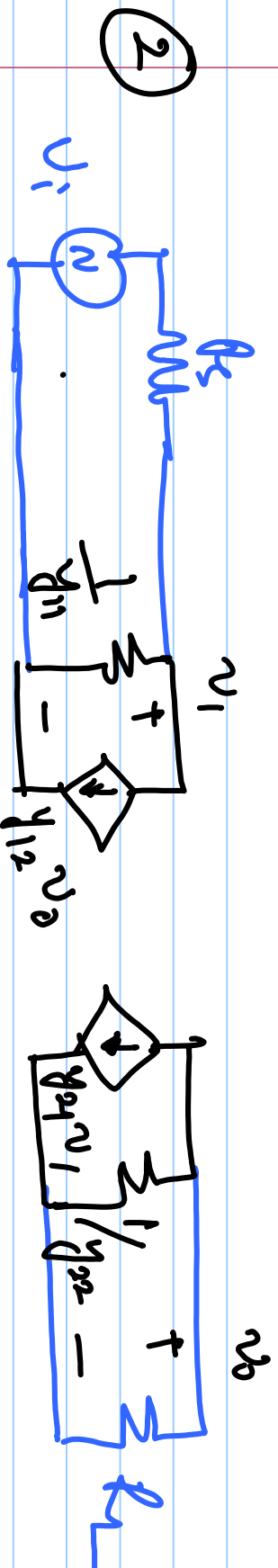
$$\textcircled{b} \quad I_1 = 0 \quad \text{for all } v_1, v_2$$

$$I_2 = \begin{cases} \beta (v_1 - v_{th})^2 & \text{when } v_1 \geq v_{th} \\ 0 & \text{otherwise} \end{cases}$$

$$\textcircled{c} \quad I_1 = 0 \quad \text{for all } v_1, v_2$$

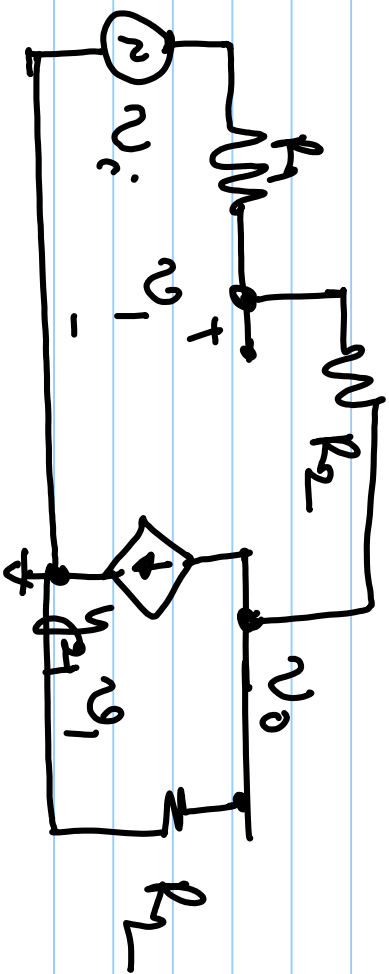
$$I_2 = \begin{cases} \beta (v_1 - v_{th})^2 (1 + \lambda v_2) & \text{when } v_1 \geq v_{th} \\ 0 & \text{otherwise} \end{cases}$$

- ① $H_1 = \frac{I_2}{I_1}$ for all V_1, V_2
 $H_2 = I_0 e^{V_1/V_T}$ for all V_1, V_2



Find v_0/v_1 : if the incremental two port network has y -parameters corresponding to Q.1 @ - (A)

3

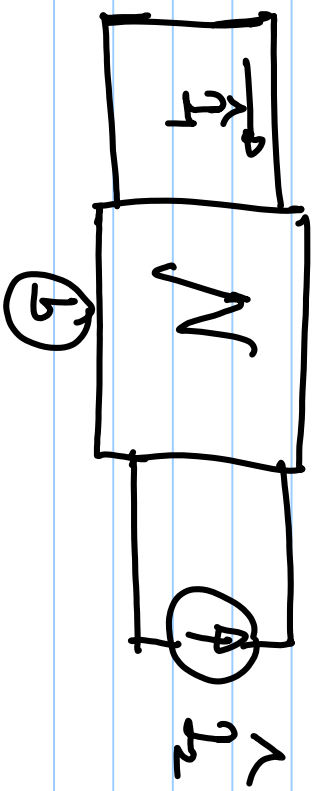
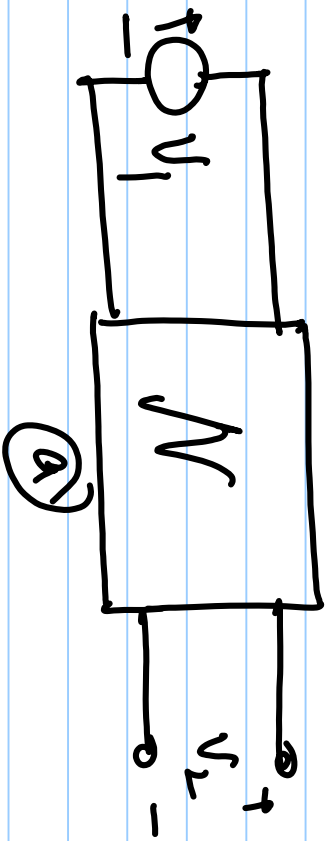


a) Find v_o/v_i

b) What is v_o/v_i when $y_2 \rightarrow \infty$

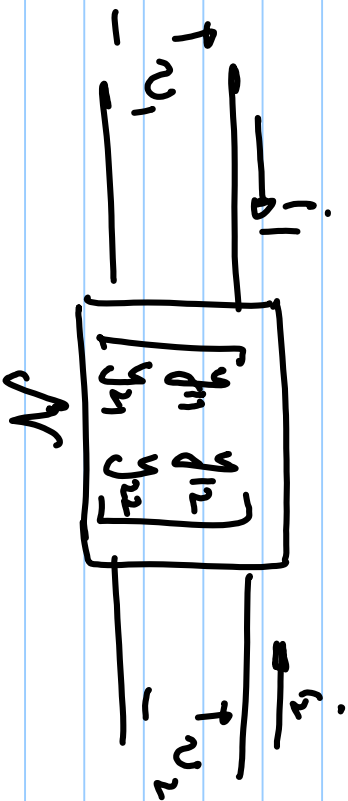
c) What is v_o/v_i when $R_L \rightarrow \infty$

4



The network N in (a) and (b) are identical two-port networks consisting of R , L and C . Using Tellegen's theorem find the relationship between V_1, V_2, I_1, I_2 . Assume steady state operation.

5



The network N comprises of only R, L and C .

Assume steady state operation.

Find the relationship between y_{12} and y_{21} .

(Think reciprocity)