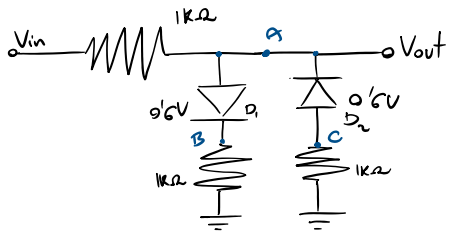
Problemas

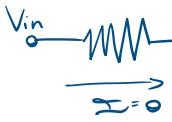
domingo, 6 de febrero de 2022 17:38

45.- 

$V_{D_1} = V_A - V_B$

$V_{D_2} = V_C - V_A$

Supongamos ambos diodos en OFF:



$I = 0$

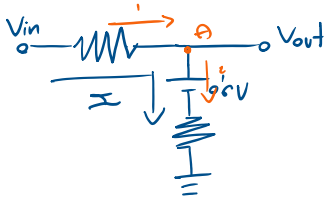
Por lo que $V_{in} = V_{out} (= V_A)$

$V_B = V_C = 0V$

Esto ocurrirá cuando:

- $V_A - 0 = V_A < 0'6V$
- $0 - V_A = -V_A < 0'6V \Rightarrow V_A > -0'6V$

Supongamos D_1 ON y D_2 OFF



$I_1 = I_2$

$\frac{V_{in} - V_A}{1K\Omega} = \frac{V_A - 0'6}{1K\Omega}$ $\quad I = \frac{V_{in}}{2} - 0'3 \, (mA)$

$V_{in} - V_A = V_A - 0'6$

$2V_A = V_{in} + 0'6V$

$V_A = \frac{V_{in}}{2} + 0'3V$

$V_{out} = \frac{V_{in}}{2} + 0'3V$

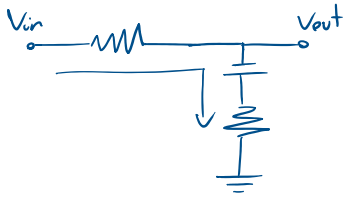
Esto ocurrirá si $(V_C = I \cdot R = \frac{V_{in}}{2} - 0'3)$

$I > 0 \Rightarrow \frac{V_{in}}{2} - 0'3 > 0 \Rightarrow \boxed{V_{in} > 0'6}$

$V_{D_2} = \cancel{V_C}^{\,0} - V_A = -\frac{V_{in}}{2} - 0'3 < 0'6$

$V_{in} > -1'8V$

Si D_1 OFF y D_2 ON



$\frac{V_{in} - V_A}{1K\Omega} = \frac{V_A + 0'6}{1K\Omega}$ $\quad I = \frac{V_{in}}{2} + 0'3 \, (mA)$

$V_{in} - 0'6 = 2V_A$

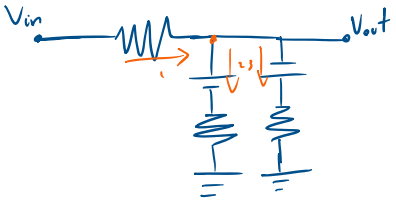
$V_A = V_{out} = \frac{V_{in}}{2} - 0'3 \, (V)$

Esto ocurre si

$V_{D_1} = V_A - \cancel{V_C}^{\,0} = \frac{V_{in}}{2} - 0'3 < 0'6 \Rightarrow V_{in} < 1'8V$

$I < 0 \Rightarrow \frac{V_{in}}{2} + 0'3 < 0 \Rightarrow \boxed{V_{in} < -0'6V}$

Suponemos ambos en ON:



$I_1 = I_2 + I_3$

$\frac{V_{in} - V_A}{1k\Omega} = \frac{V_A - 0'6}{1k\Omega} + \frac{V_A + 0'6}{1k\Omega}$

$V_{in} - V_A = 2V_A \Rightarrow V_A = \frac{V_{in}}{3}$ (V)

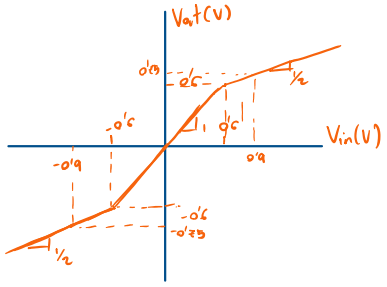
$V_{out} = \frac{V_{in}}{3}$

Esto ocurrirá si

- $I_2 > 0 \Rightarrow \frac{V_{in}}{3} - 0'6 > 0 \Rightarrow \boxed{V_{in} > 1'8}$
- $I_3 < 0 \Rightarrow \frac{V_{in}}{3} + 0'6 < 0 \Rightarrow \boxed{V_{in} < -1'8}$

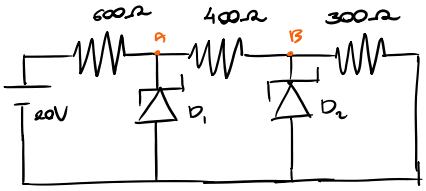
} Imposible

Luego



$V_{out} = \begin{cases} \frac{V_{in}}{2} - 0'3 & V_{in} < -0'6 \text{ (V)} \\ V_{in} & -0'6 \le V_{in} \le 0'6 \text{ (V)} \\ \frac{V_{in}}{2} + 0'3 & 0'6 < V_{in} \text{ (V)} \end{cases}$

46.-



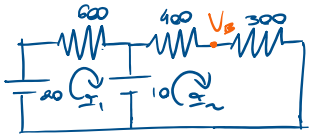
$V_{\gamma 1} = V_{\gamma 2} = 0'6V$

$V_{Z_1} = 10V \quad V_{Z_2} = 8V$

Supongamos D_1 y D_2 en OFF

$I = \frac{20V}{1'3k\Omega} = 15'38 \text{ mA} \Rightarrow V_{D_1} = -V_A = -(20 - IR_1) = IR_1 - 20 = -13'85V < -10V = -V_{Z_1} \Rightarrow$ Contradicción

Supongo D_1 ON (invertido) y D_2 OFF



I_1: $20 - 10 = I_1(600)$

$10 = 600 I_1 \Rightarrow I_1 = 16'6 \text{ mA}$

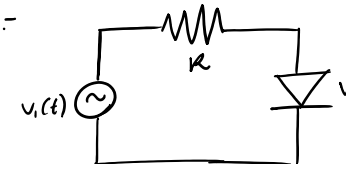
I_2: $10 = 700 I_2 \Rightarrow I_2 = 14'28 \text{ mA}$

Comprobamos que: $V_{D_2} = -V_B = -(20 - I_1 600 - I_2 400) = -4'29V > -8 = -V_{Z_2} \Rightarrow$ Correcto

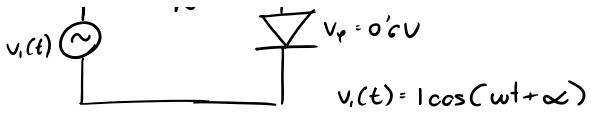
$I_{D_1} < 0 \Rightarrow I_2 - I_1 = -2'39 \text{ mA} < 0 \Rightarrow$ Correcto

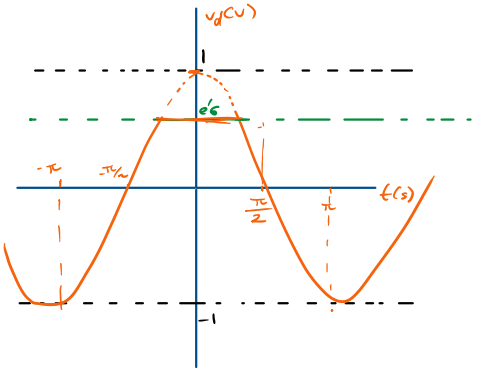
$I_{R_1} = I_1 = 16'6 \text{ mA} \quad I_{R_2} = I_{R_3} = I_2 = 14'28 \text{ mA}$

47.-



$V_i(t) = 1 \cos(\omega t + \alpha)$



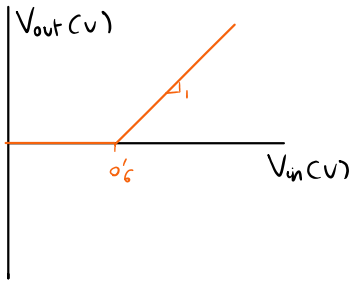


b) Característica de transferencia:

$V_{out} = V_R$

Si $V_{in} < 6V \Longrightarrow V_{out} = \not{\mathcal{I}}^{\,0} \cdot Z_R = 0V \Rightarrow v_{out}(t) = 0V$

$V_{in} \geq 6V \Longrightarrow V_{out} = \mathcal{I} \cdot Z_R = \frac{V_{in} - 0'6}{\cancel{Z_R}} \cdot \cancel{Z_R} = V_{in} - 0'6V \Rightarrow v_{out}(t) = v_{in}(t) - 0'6\,U$



$V_{out} = V_D$

Si $V_{in} < 0'6 \Longrightarrow V_D = V_{in} = V_{out}$

$V_{in} \geq 0'6 \Longrightarrow V_D = V_{out} = 0'6V$