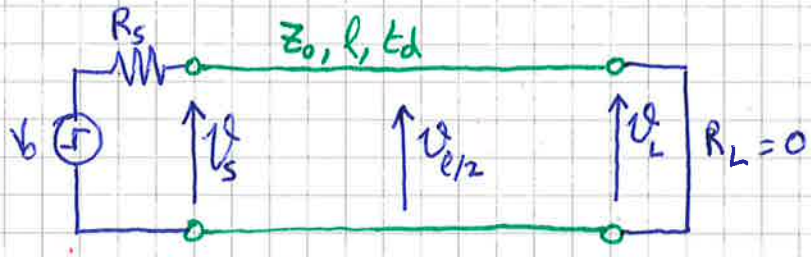
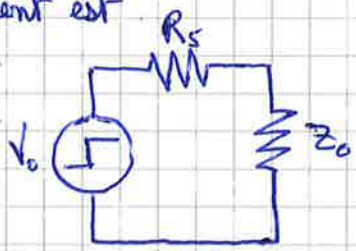
ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

d) Terminaisons résistives

C17 - Ligne court circuitée

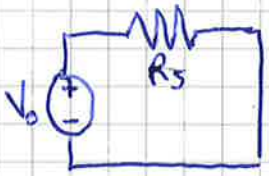


A $t = 0$, du point de vue de la source la ligne est infinie. Initialement, le circuit équivalent est



à $t = 0$ — circuit initial équivalent

alors qu'en régime permanent, c'est



à $t \to +\infty$ — circuit final équivalent

La perturbation initiale lance une tension v_1^+ vers la droite telle que

$$v_1^+ = \frac{Z_0 V_0}{R_S + Z_0}$$

qui vaut

$$\begin{cases} \text{(i)} & v_1^+ = \dfrac{3V_0}{4} \quad \text{pour} \quad R_S = \dfrac{Z_0}{3} \\ \text{(ii)} & v_1^+ = \dfrac{V_0}{2} \quad \text{pour} \quad R_S = Z_0 \\ \text{(iii)} & v_1^+ = \dfrac{V_0}{4} \quad \text{pour} \quad R_S = 3Z_0 \end{cases}$$

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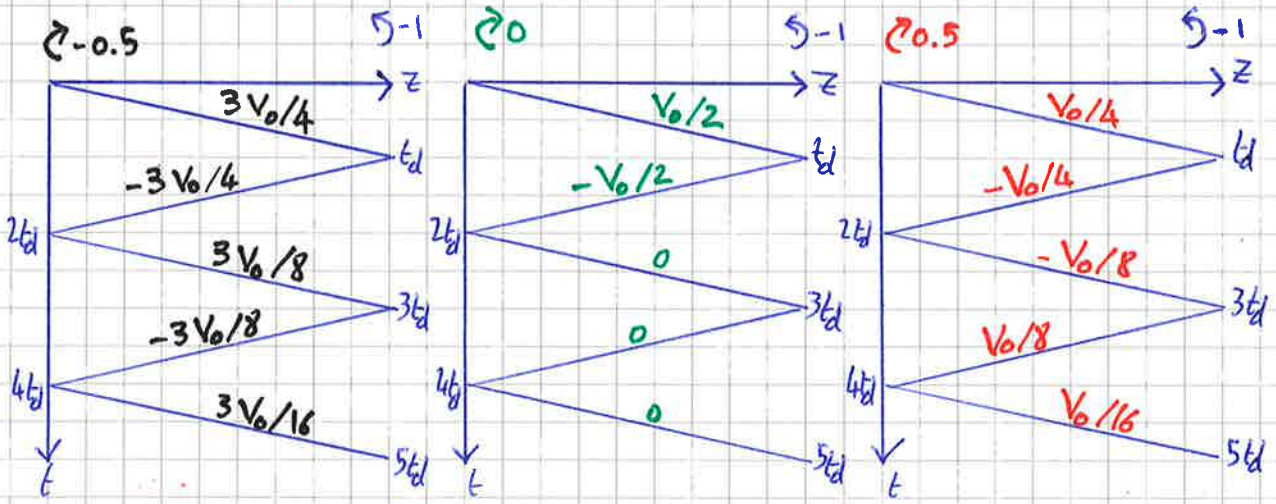
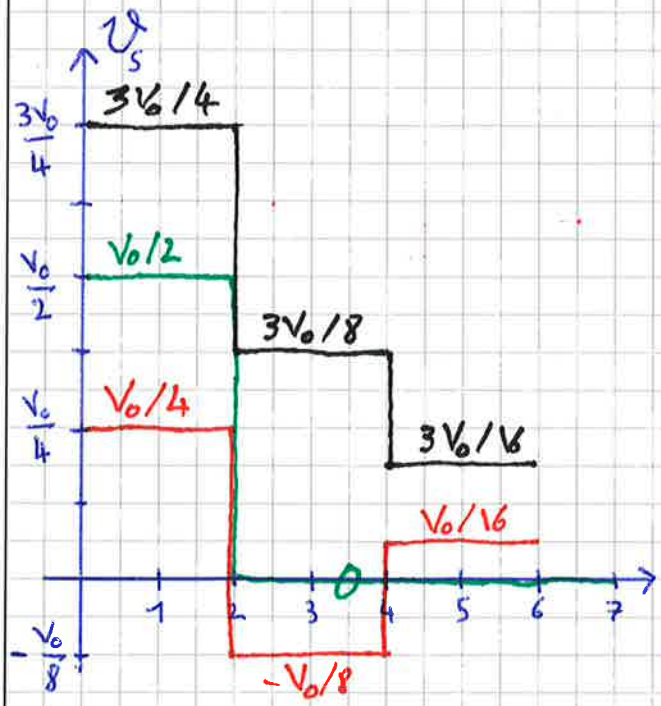
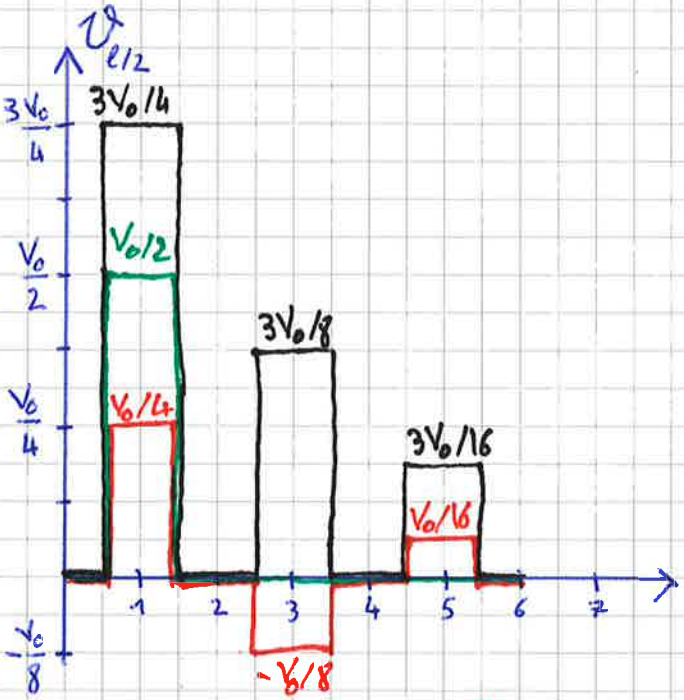
Pour dessiner le diagramme des réflexions multiples, on calcule d'abord les coefficients de réflexions :

$\Gamma_L = \frac{R_L - Z_0}{R_L + Z_0} = \frac{0-1}{0+1} = -1$ pour le court-circuit et

(i) $\Gamma_S = \frac{1/3 - 1}{1/3 + 1} = -0.5$ (ii) $\Gamma_S = \frac{1-1}{1+1} = 0$ (iii) $\Gamma_S = \frac{3-1}{3+1} = +0.5$







* Rq: $v_e = 0 \quad \forall t$.

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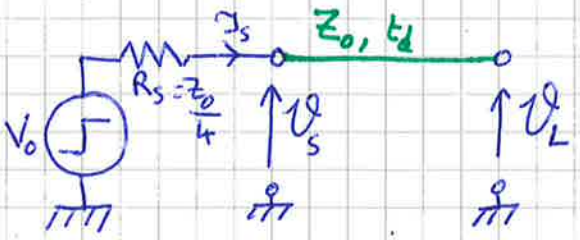
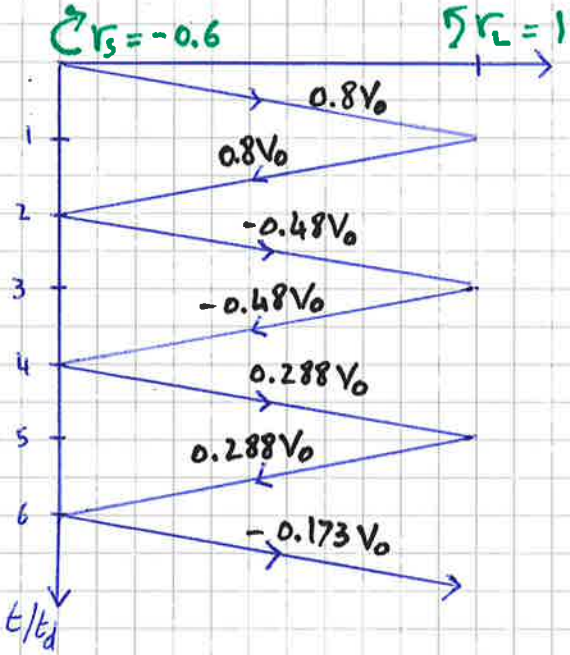
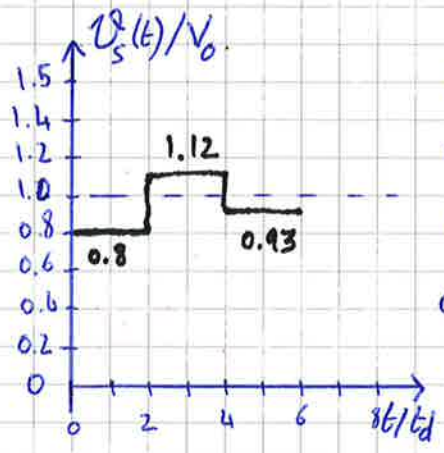
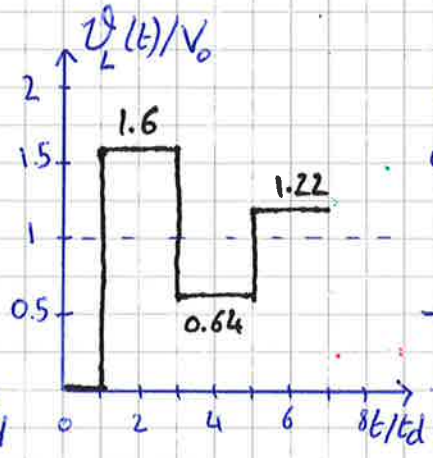
C 18 - Surosaillations dans les portes logiques alimentées par un bus basse impédance

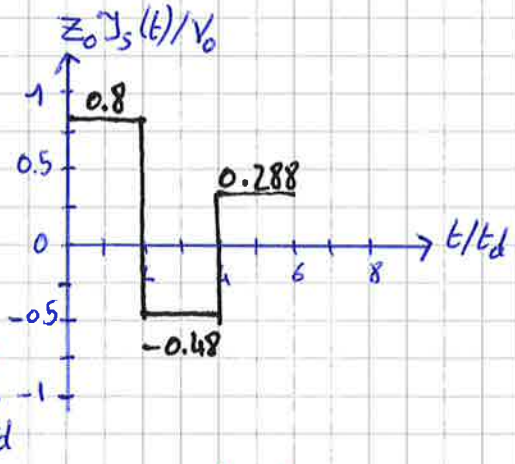




$$\begin{cases} r_s = \dfrac{\frac{1}{4}-1}{\frac{1}{4}+1} = -\dfrac{3}{5} = -0.6 \\ r_L = +1 \\ v_1^+ = \dfrac{Z_0 V_0}{\frac{Z_0}{4}+Z_0} = 0.8\,V_0 \end{cases}$$







Dépassement de la tension v_L par rapport à sa valeur asymptotique :

$$100 \times \frac{1.6V_0 - V_0}{V_0} = \underline{60\,\%}$$

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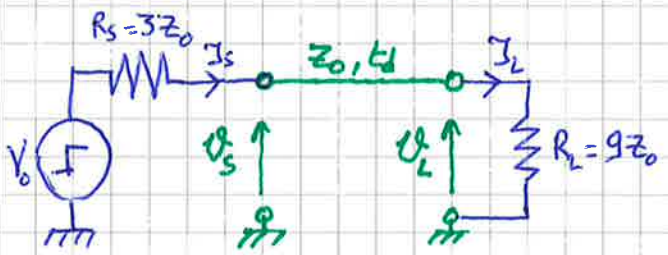
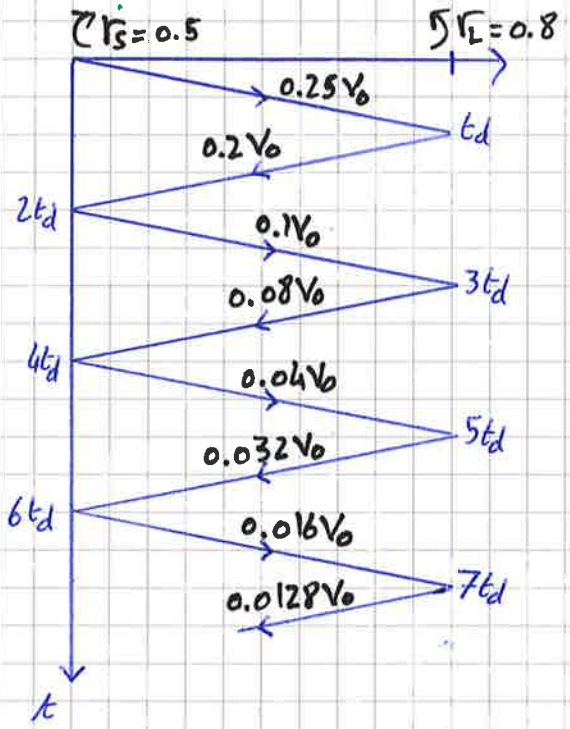
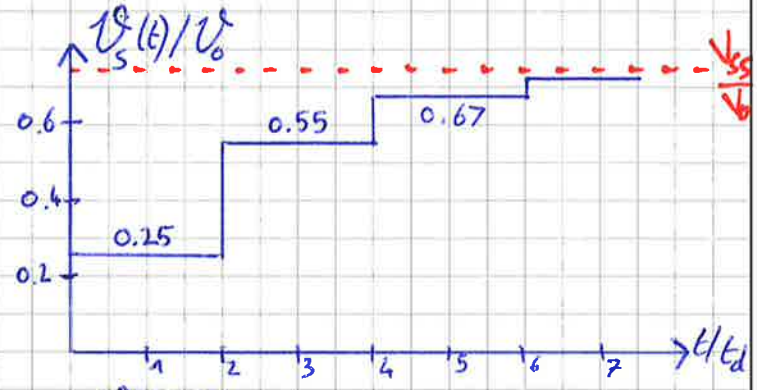
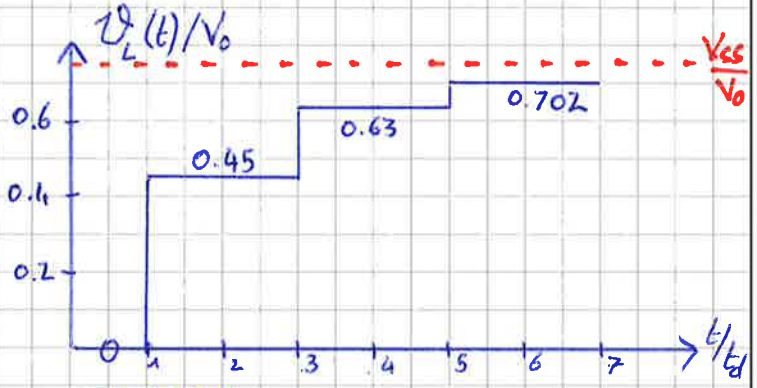
C19 – Ligne terminée par une résistance

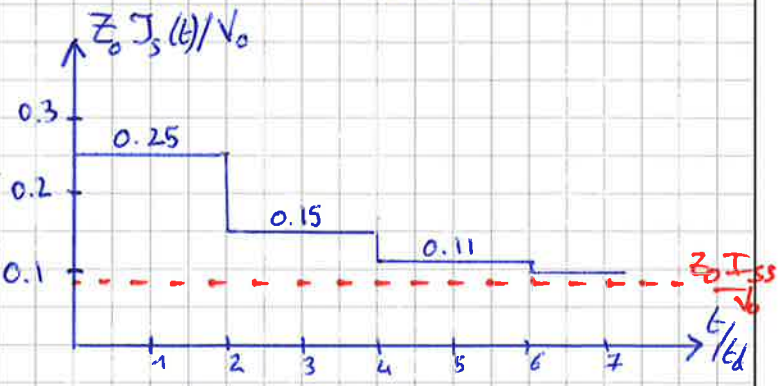


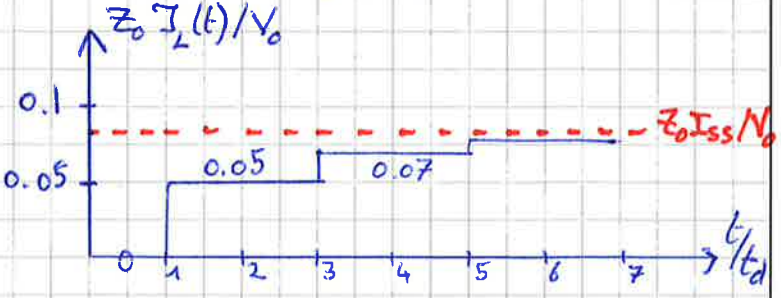
$$\begin{cases} v_1^+ = V_0 \times Z_0/4Z_0 = V_0/4 \\ r_S = \dfrac{3Z_0 - Z_0}{3Z_0 + Z_0} = 0.5 \\ r_L = \dfrac{9Z_0 - Z_0}{9Z_0 + Z_0} = 0.8 \end{cases}$$



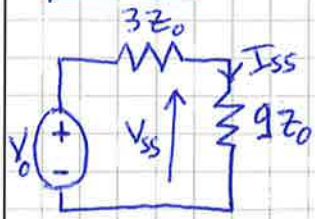








circuit équivalent en régime permanent :



$$V_{SS} = \frac{9Z_0 V_0}{9Z_0 + 3Z_0} = \underline{0.75 V_0}$$

$$I_{SS} = \frac{V_0}{9Z_0 + 3Z_0} = \underline{0.083}\ \frac{V_0}{Z_0}$$

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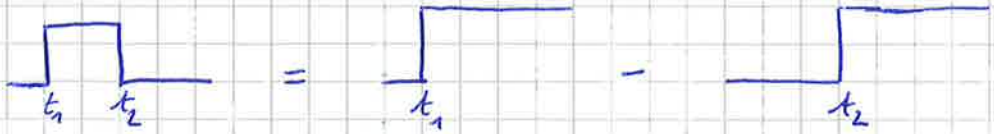
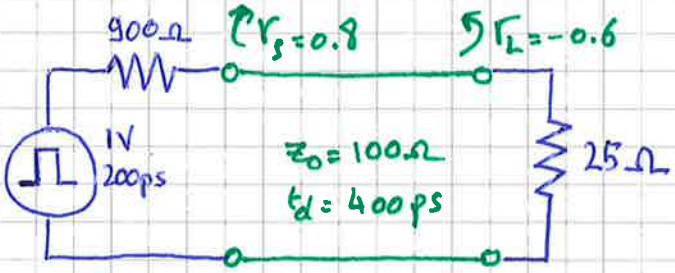
C 2.0 - Impulsion rectangulaire





$$\begin{cases} v_1^+ = \frac{100}{1000} \times 1V = 100\,mV \\ r_s = (900-100)/(900+100) = 0.8 \\ r_L = (25-100)/(25+100) = -0.6 \end{cases}$$