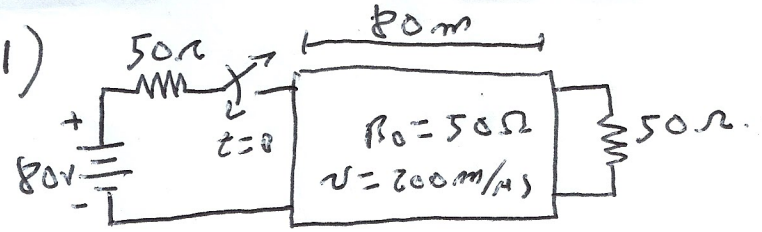
2-1)



a) Plot Voltage at both ends of the line

b) Repeat (a) for the currents

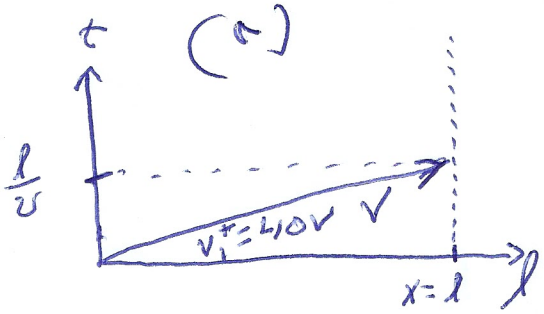
$$\Gamma_L = \frac{R_L - R_0}{R_L - R_0} = \frac{50-50}{50+50} = 0$$

$$\Gamma_g = \frac{50-50}{50+50} = 0$$

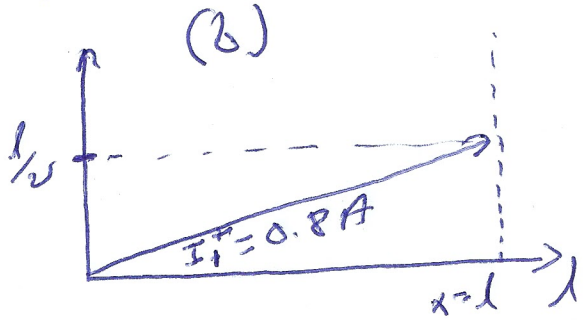
$$V_1^+ = E\frac{R_0}{R_0+R_g} = 80\left(\frac{50}{50+50}\right) = 40V \Rightarrow I_1^+ = \frac{40}{50} = 0.8$$

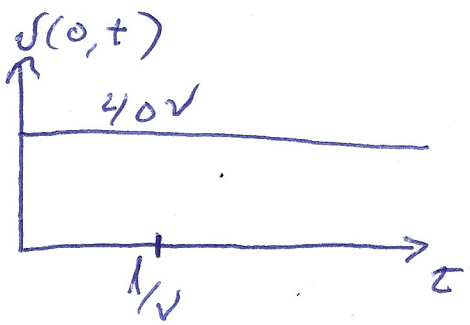
$$V_1^- = \Gamma_L(EV_1^+) = (0)(40) = 0V \Rightarrow I_1^- = \frac{0}{50} = 0A.$$

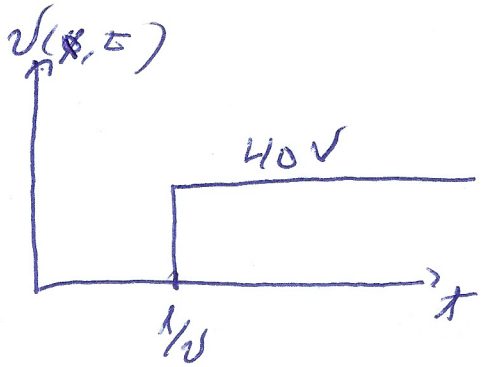
(a)

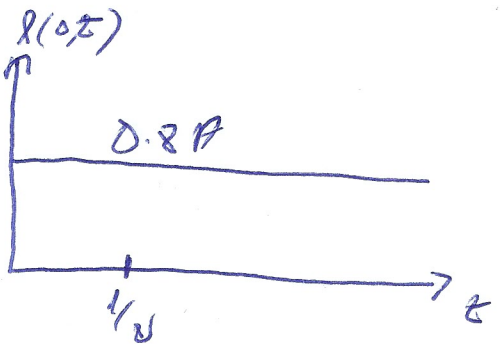


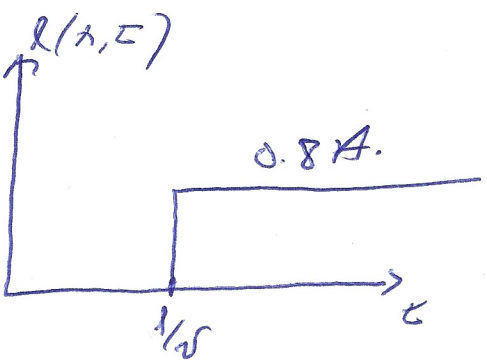
(b)



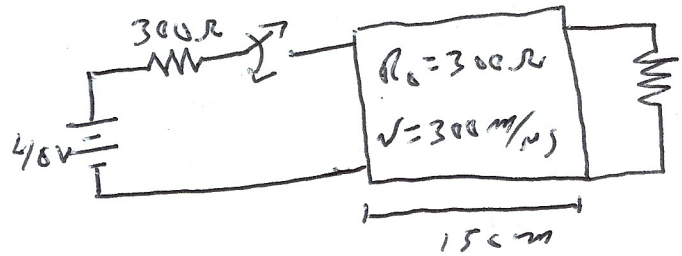








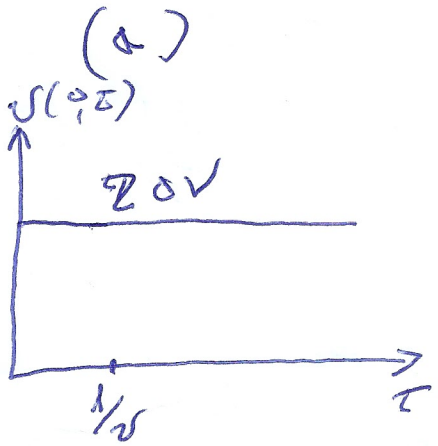
2-2)

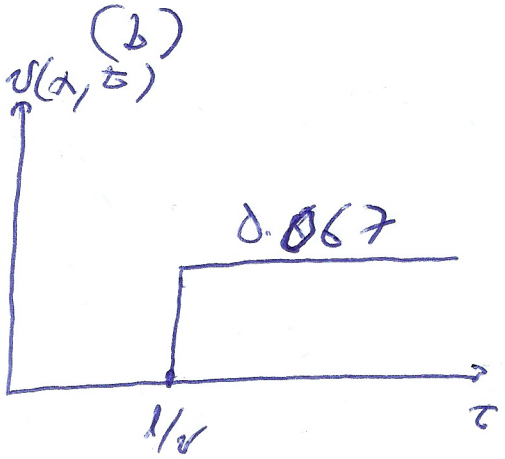


$\Gamma_L = 0$, $\Gamma_g = 0$

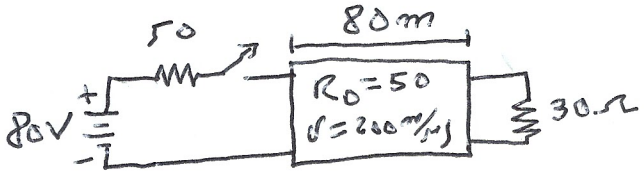
$V_1^+ = E\left[\frac{R_0}{R_0+R_g}\right] = 40\left[\frac{300}{300+300}\right] = 20V \Rightarrow I_1^+ = \frac{V_1^+}{R_0} = \frac{20}{300} = 0.067$

$V_1^- = \Gamma_L(V_1^+) = 0 \Rightarrow I_1^- = \frac{V_1^-}{R_0} = \frac{0}{300} = 0A$





2-3



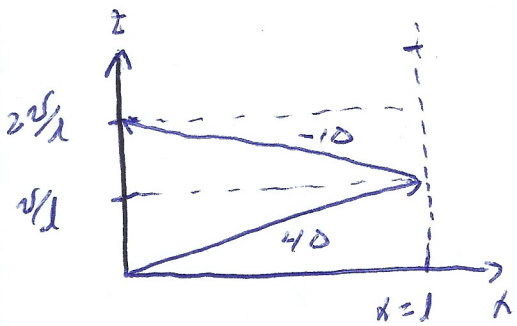
$\Gamma_L = \frac{R_L - R_0}{R_L + R_0} = \frac{30-50}{30+50} = -0.25$

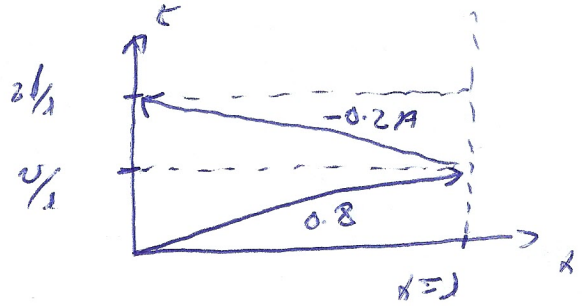
$\Gamma_g = 0$

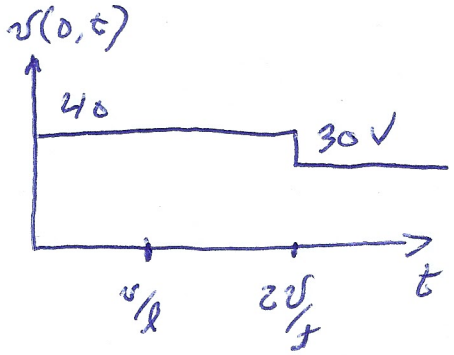
$V_1^+ = 80\left(\frac{50}{50+50}\right) = 40V \Rightarrow I_1^+ = \frac{V_1^+}{R_0} = \frac{40}{50} = 0.8A$

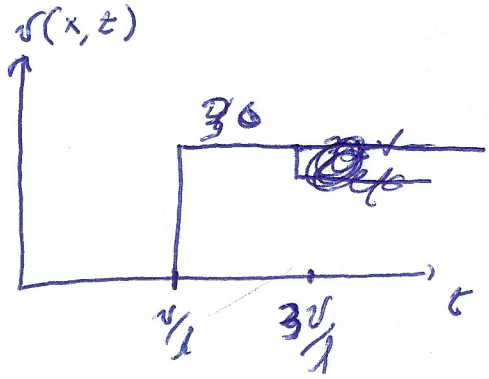
$V_1^- = \Gamma_L(V_1^+) = -0.25(40) = -10V \Rightarrow I_1^- = \frac{-10}{50} = -0.2A$

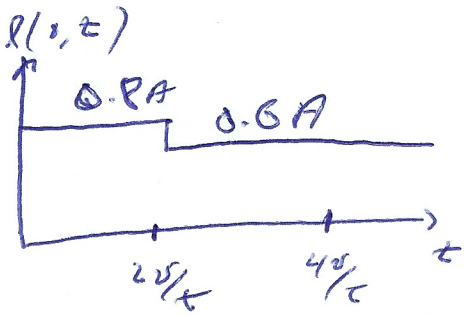
$V_2^+ = \Gamma_g(V_1^-) = 0(-10) = 0 \Rightarrow I_2^+ = \frac{0}{R_0} = 0A.$

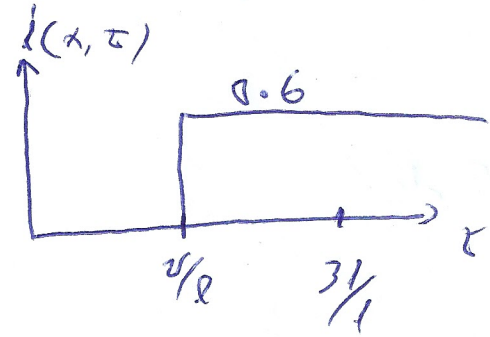




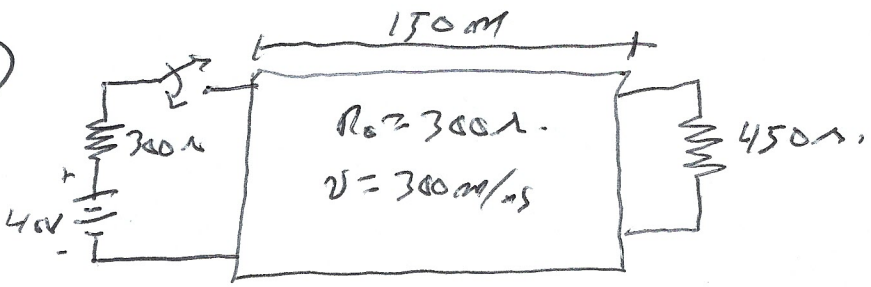








24)



a) Plot voltage at both ends of the line

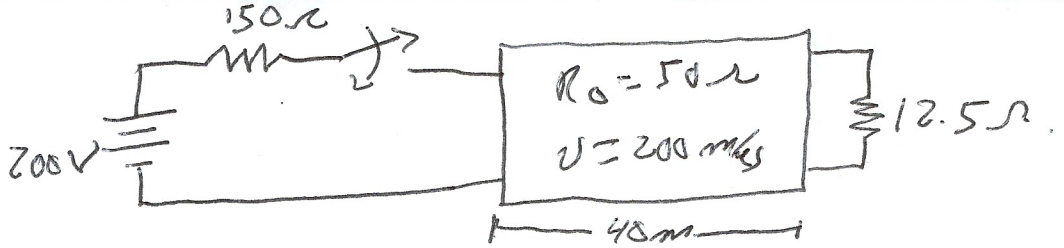
b) repeat (a) for the currents.

$$t_1 = \frac{150}{\frac{300m}{1\times10^{-6}}} = 0.5\mu s.$$

$$\Gamma_g = \frac{300-300}{300+300} = 0$$

$$\Gamma_L = \frac{450-300}{300+300} = \frac{150}{600} = 0.25$$

2-5)



(4)

a) Plot the $v(0,t)$ and $v(\ell,t)$

b) repeat (a) for the currents $I(0,t)$ and $I(\ell,t)$

a) $t_1 = \frac{40}{\frac{200m}{10^{-6}s}} = 0.2\ \mu s$

$\Gamma_L = \frac{R_g - R_0}{R_g + R_0} = \frac{12.5 - 50}{12.5 + 50} = -0.6$

$\Gamma_g = \frac{R_L - R_0}{R_L + R_0} = \frac{150 - 50}{150 + 50} = 0.5$

$V_1^+ = E\left(\frac{R_0}{R_0 + R_g}\right) = \frac{50}{50 + 150}(200) = 50V \Rightarrow I_1^+ = \frac{V_1^+}{R_0} = \frac{50}{50} = 1A$

$V_1^- = \Gamma_L(V_1^+) = -0.6(50) = -30V \Rightarrow I_1^- = \frac{-30}{50} = -0.6A.$

$V_2^+ = \Gamma_g(V_1^-) = 0.5(-30) = -15V \Rightarrow I_2^+ = \frac{-15}{50} = -0.3A.$

$V_2^- = \Gamma_g(V_2^+) = -0.6(-15) = 9V \Rightarrow I_2^- = \frac{9}{50} = 0.18A.$

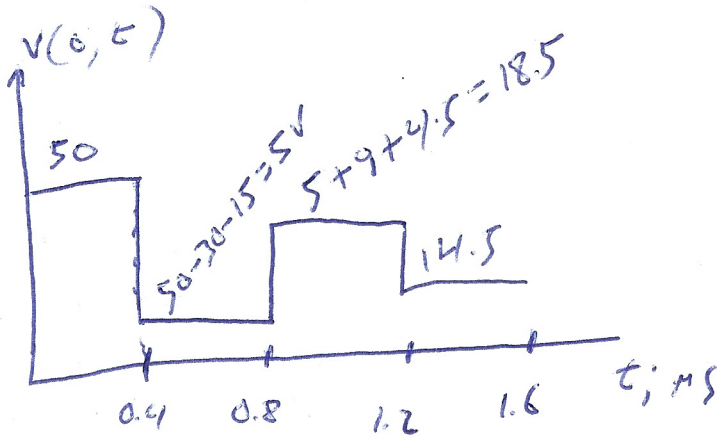
$V_3^+ = \Gamma_g(V_2^-) = 0.5(9V) = 4.5V \Rightarrow I_3^+ = \frac{4.5}{50} = 0.09A$

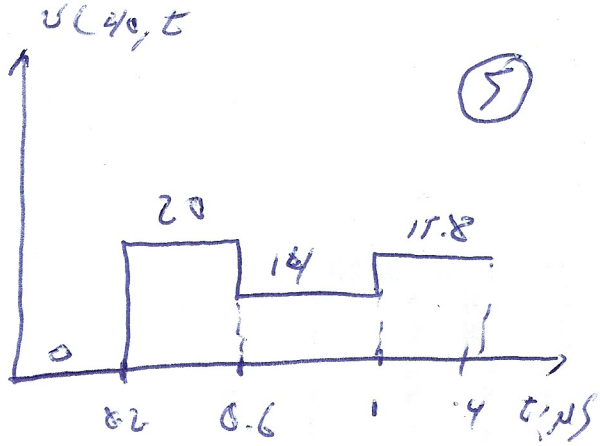
$V_3^- = \Gamma_L(V_3^+) = -0.6(V_3^+) = -0.6(4.5) = -2.7V \Rightarrow I_3^- = 0.054A$

$V_4^+ = \Gamma_g(V_3^-) = +0.5(-2.7) = -1.35V \Rightarrow I_4^+ = \frac{1.62}{50} = 0.032A$

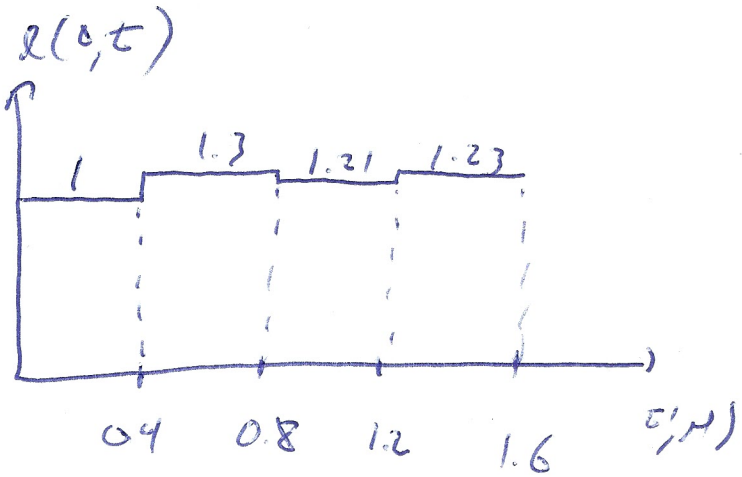
$V_4^- = \Gamma_L(V_3^+) = -0.6(-1.35) = 0.81V \Rightarrow I_4^- = \frac{0.81}{50} = 0.0162A$

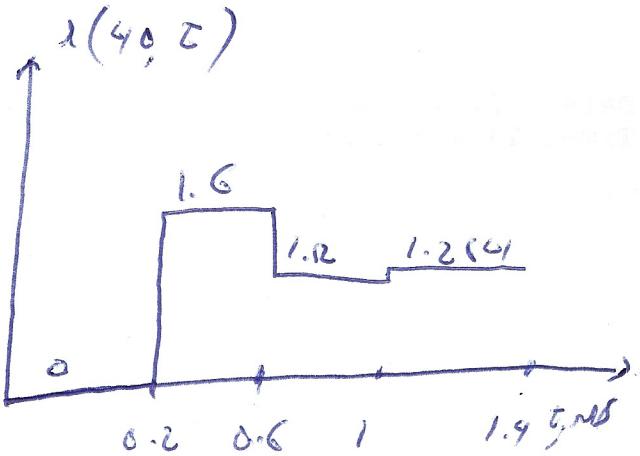
a)



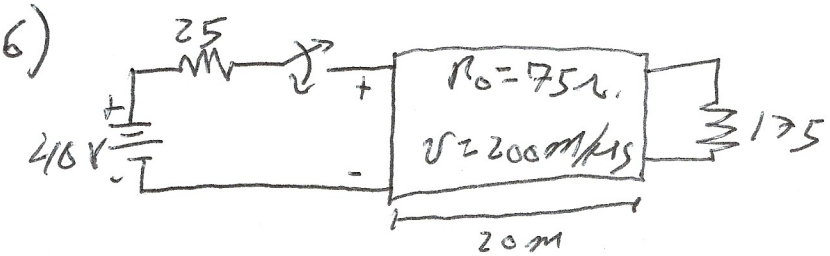


b)





2-6)



a) plot the V(0,t) and (V(x,t))

b) repeat (a) for the currents I(0,t) and I(x,t)

$$\tau_1 = \frac{20}{\frac{200m}{1\times10^{-6}}} = 0.1\,\mu s$$

$$\Gamma_L = \frac{R_L - R_0}{R_L + R_0} = \frac{175-75}{175+75} = 0.4$$

$$\Gamma_g = \frac{R_g - R_0}{R_g + R_0} = \frac{25-75}{075+25} = -0.5$$

$$V_1^+ = E\left(\frac{R_0}{R_0+R_g}\right) = 40\left(\frac{75}{75+25}\right) = 30V \Rightarrow I_1^+ = \frac{30}{75} = 0.4A$$

$$V_1^- = \Gamma_L(V_1^+) = 0.4(30) = 12V \Rightarrow I_1^- = \frac{12}{75} = 0.16A$$

$$V_2^+ = \Gamma_g(V_1^-) = -0.5(12) = -6V \Rightarrow I_2^+ = \frac{-6}{75} = -0.08A$$

$$V_2^- = \Gamma_L(V_2^+) = 0.4(-6) = -2.4V \Rightarrow I_2^- = \frac{-2.4}{75} = -0.032A$$

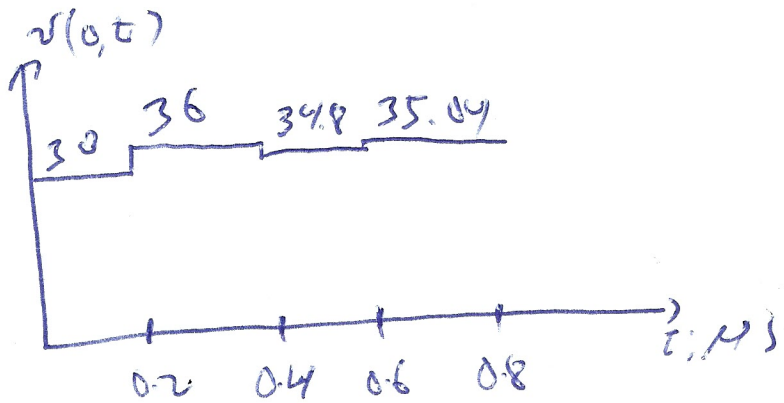
$$V_3^+ = \Gamma_g(V_2^-) = -0.5(-2.4) = 1.2V \Rightarrow I_3^+ = \frac{1.2}{75} = 0.016A$$

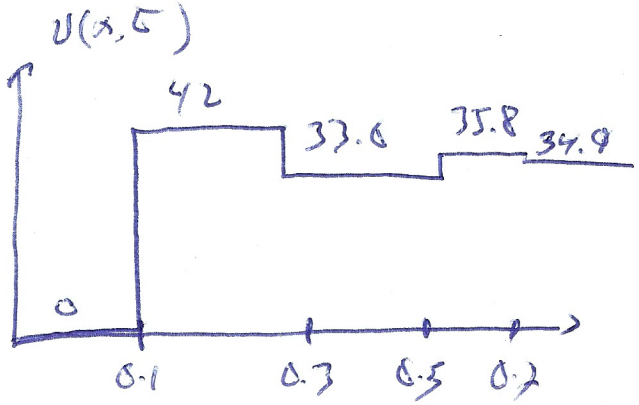
$$V_3^- = \Gamma_L(V_3^+) = 0.4(1.2) = 0.48V \Rightarrow I_3^- = \frac{0.48}{75} = 0.0064A$$

$$V_4^+ = \Gamma_g(V_3^-) = -0.5(0.48) = -0.24V \Rightarrow I_4^+ = \frac{-0.24}{75} = -0.0032A$$

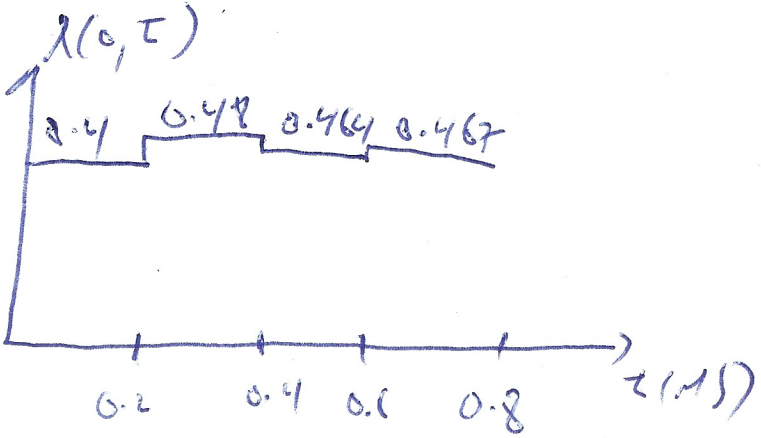
$$V_4^- = \Gamma_L(V_4^+) = 0.4(V_4^+) = -0.096V \Rightarrow I_4^- = \frac{-0.096}{75} = -0.00128A$$

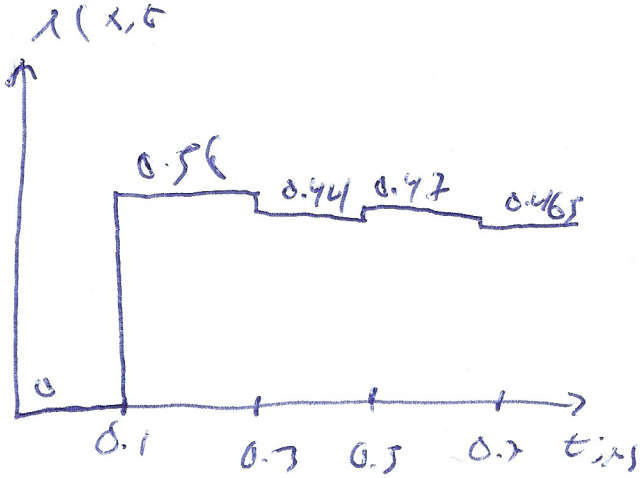
a)



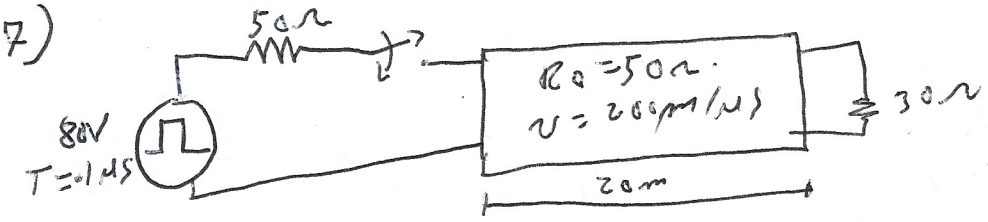


b)





2-7)



$$\Gamma_g = \frac{50-50}{100} = 0$$

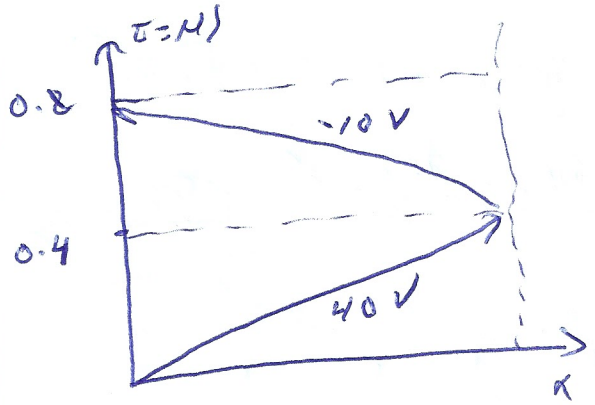
$$\Gamma_2 = \frac{30-50}{80} = -0.25$$

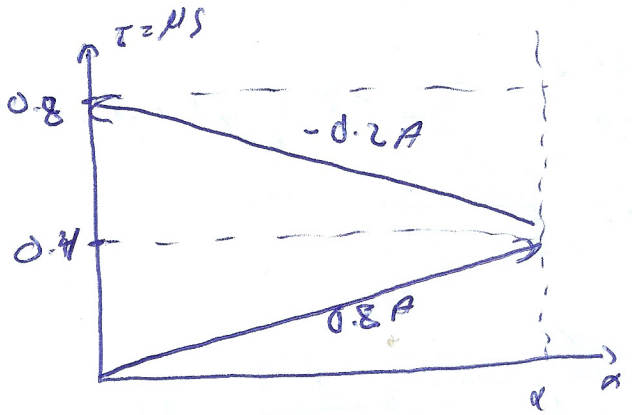
$$T_1 = \frac{d}{v} = \frac{80}{\frac{200}{1\times10^{-6}}} = 0.4\mu s$$

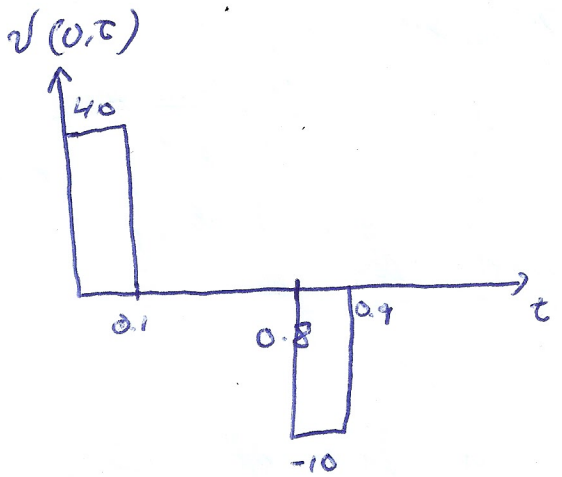
$$V_1^+ = 80\left[\frac{50}{100}\right] = 40V \Rightarrow I_1^+ = \frac{40}{50} = 0.8A$$

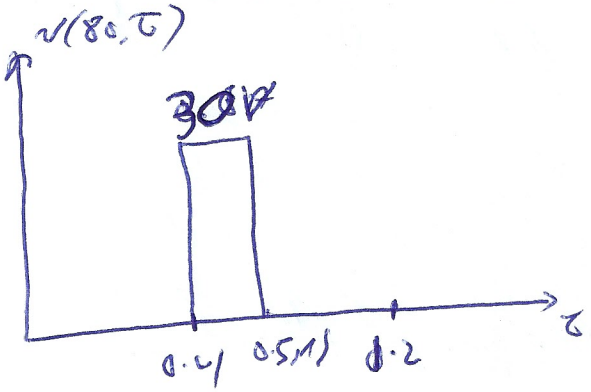
$$V_1^- = (40)(-0.25) = -10V \Rightarrow I_1^- = \frac{-10}{50} = -0.2A$$

$$V_2^+ = 0 \Rightarrow I_2^+ = 0$$

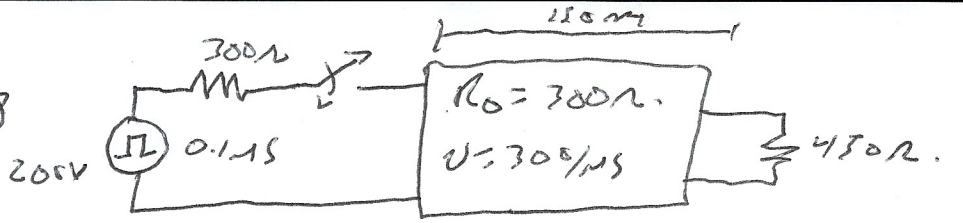








2-8



$$\Gamma_g = \frac{R_g - R_0}{R_g + R_0} = \frac{300-300}{600} = 0$$

$$\Gamma_L = \frac{R_L - R_0}{R_L + R_0} = \frac{450-300}{450+300} = \frac{150}{750} = 0.2$$

$$t_1 = \frac{\ell}{v} = \frac{150}{\frac{300\text{m}}{10^{-6}\text{s}}} = 0.5\,\mu\text{S}$$

$$V_1^+ = E\,\frac{R_0}{R_0 + R_g} = 200\left[\frac{300}{600}\right] = 100\text{V} \Rightarrow I_1^+ = \frac{100}{300} = 0.33\text{A}$$

$$V_1^- = \Gamma_L(V_1^+) = (0.2)(100) = 20\text{V} \Rightarrow I_1^- = \frac{20}{300} = 0.067\text{A}$$