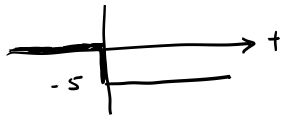
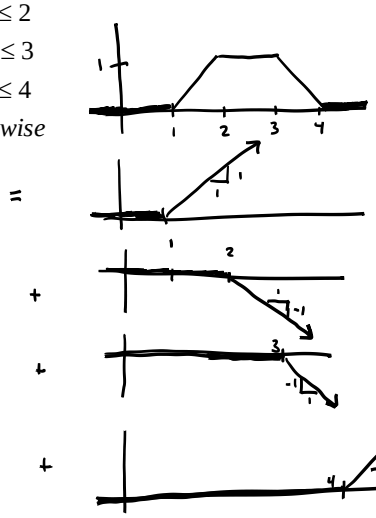
1) Express the following signal in terms of singularity functions, i.e. u(t), δ(t), r(t). Hint: sketch them first.

a) $v(t) = \begin{cases} 0, & t < 0 \\ -5, & t \geq 0 \end{cases}$



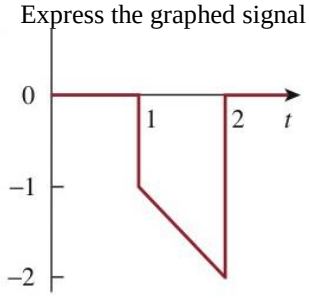
$-5\,u(t)$

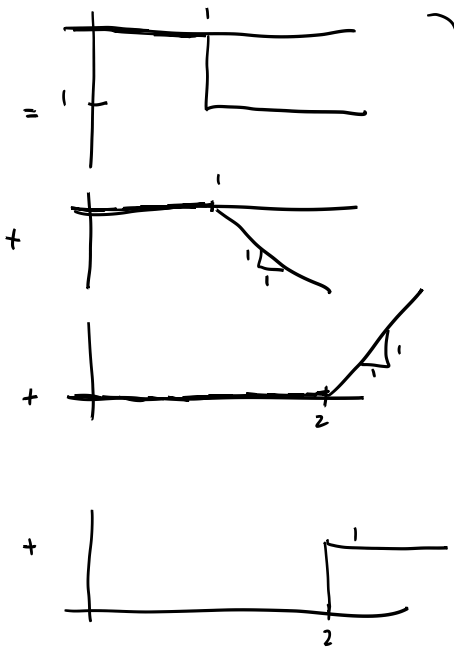
b) $i(t) = \begin{cases} t-1, & 1 < t \leq 2 \\ 1, & 2 < t \leq 3 \\ 4-t, & 3 < t \leq 4 \\ 0, & otherwise \end{cases}$



$r(t-1) - r(t-2) - r(t-3) + r(t-4)$

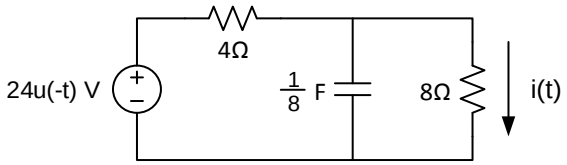
2) Express the graphed signal v(t) in terms of singularity functions.



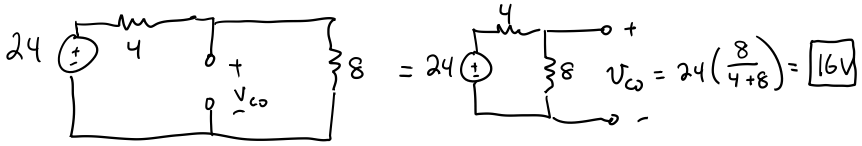


$u(t-1) - r(t-1) + r(t-2) + 2u(t-2)$

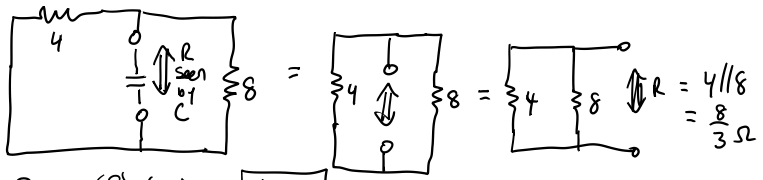
3) Find i(t) for t≥0 in the circuit below:



① Find V_{co} : $t<0$ $u(-t)=1$



② Find τ : $t\geq 0$ $u(-t)=0$



$\tau = RC = \left(\frac{8}{3}\right)\left(\frac{1}{8}\right) = \boxed{\frac{1}{3}\ s}$

③ Find $v_c(t)$

$v_c(t) = V_{co}e^{-t/\tau} = 16e^{-3t}$

④ Find $i(t)$

$i(t) = \frac{v_R(t)}{R} = \frac{v_c(t)}{R} = \frac{16e^{-3t}}{8} = \boxed{2e^{-3t}\ A}$