1) ia) $R_0 = 1\,k\Omega$ $R_1 = 10\,m\Omega$ $V = 1.2\,V$

$= 1000\,\Omega$ $= 1{,}000{,}000\,\Omega$

$R_{tot} = 1{,}001{,}000\,\Omega$

$V_{out} = V_{in} \cdot \frac{R_2}{R_1+R_2}$ $V_{out} = 1.2 \cdot \frac{R_1}{R_1+R_0} = \frac{1000000}{1001000} \cdot 1.2 = 1.1988\,V$

ib) $R_1 = R_0 = 1\,k\Omega$

$V_{out} = 1.2 \cdot \frac{R_1}{R_0+R_1} = 1.2 \cdot \frac{1000}{2000} = 0.6\,V$

ic) $R_1 = 1\,\Omega$ $R_0 = 1000\,\Omega$

$V_{out} = 1.2 \cdot \frac{R_1}{R_0+R_1} = 1.2 \cdot \frac{1}{1001} = 0.0012\,V$

ii) c

iii) a

iv) b

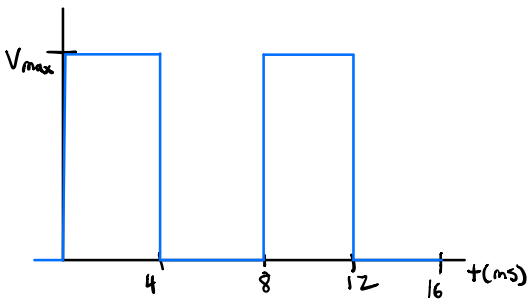
2) i) Charging

$V_C(t) = V_{max}(1 - e^{-t/RC})$

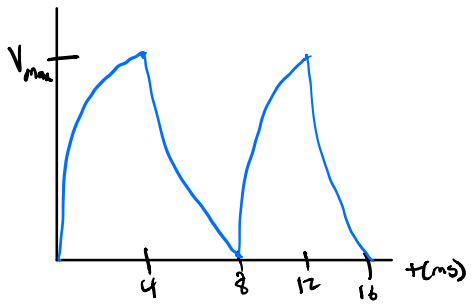
Discharging

$V_C(t) = V_0(e^{-t/RC})$

Vin)



$V_C(t)$)



ii) $R_0 = 1\,k\Omega \quad C_1 = 1\,\mu F \quad \tau = RC = (1000)(1 \cdot 10^{-6}) = 0.001$

a) $t = 4\ ms = 4 \cdot 10^{-3}\ s$

$V_c(4 \cdot 10^{-3}) = (0.6)(1 - e^{-4 \cdot 10^{-3}/0.001}) = 0.6 - 0.6e^{-4 \cdot 10^{-3}/0.001}$

$= 0.589\ V$

b) $t = 8 \cdot 10^{-3}\ s$

$V_c(4 \cdot 10^{-3}) = 0.589(e^{-4 \cdot 10^{-3}/0.001}) = 0.011\ V$

iii) $R_0 = 1000\,\Omega \quad C_1 = 1 \cdot 10^{-6}\ F \quad RC = 0.001$

$0.63 = 1(1 - e^{-t/0.001}) = 1 - e^{-t/0.001}$

$-(0.63 - 1) = e^{-t/0.001}$

$0.37 = e^{-t/0.001}$

$\ln(0.37) = -t/0.001$

$t = -\ln(0.37) \cdot 0.001 = 9.943 \cdot 10^{-4}\ s$