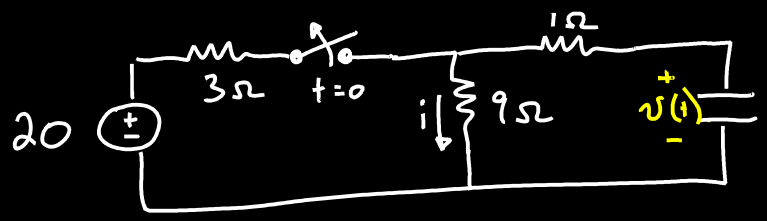
First Order Problem



Find i for all time

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① $V_0 = v_c(t=0^-) \quad \therefore t<0 \quad = \boxed{15V}$

② τ

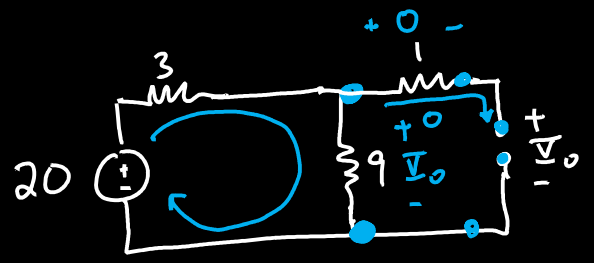
③ V_∞

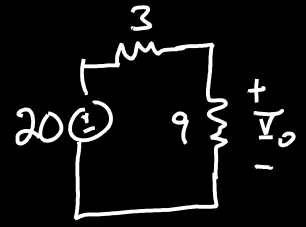
④ $v(t) = V_\infty + (V_0 - V_\infty)\, e^{-t/\tau}$

⑤ $i(t)$

⑥ All time

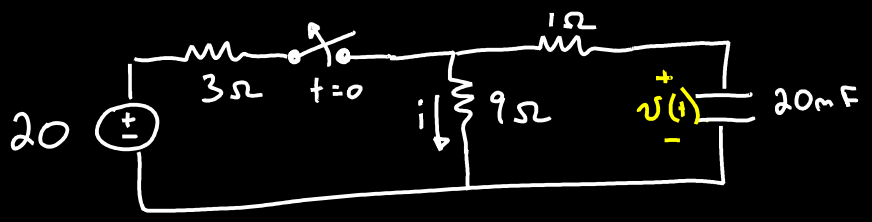
$t<0$





$$V_0 = 20\,\frac{9}{3+9} = 20\cdot\frac{9}{12} = \frac{5}{20}\,\frac{3}{4_1} = 15V$$

First Order Problem



Find i for all time

① $V_0 = v_c(t \le 0) \quad \because t < 0 \quad = \boxed{15V}$

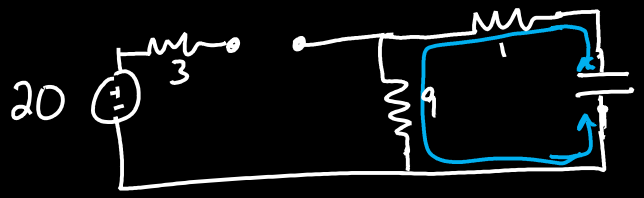
② τ : $0 < t < \infty \quad = \boxed{\frac{1}{5}s}$

③ V_∞

④ $v(t) = V_\infty + (V_0 - V_\infty)\, e^{-t/\tau}$

⑤ $i(t)$

⑥ All time



$R_{eq} = 1 + 9 = 10\,\Omega$

$C = 20mF$

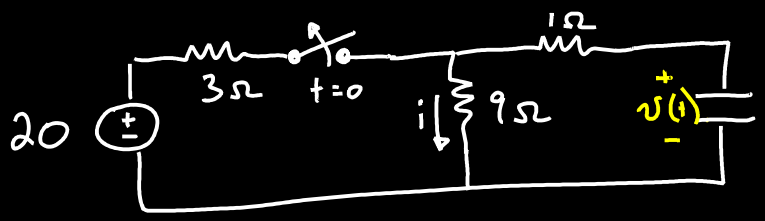
$\tau = RC$

$= (10)(20m)$

$= 200m$

$= \boxed{\frac{1}{5}s}$

First Order Problem



Find i for all time

① $V_0 = v_c(t=0^-) : t<0 = \boxed{15V}$

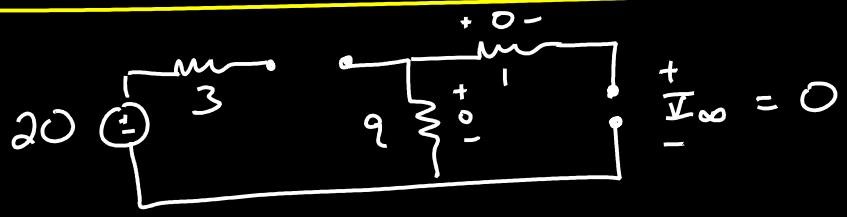
② $\tau : 0<t<\infty = \boxed{\frac{1}{5}s}$

③ $V_\infty = v_c(t=\infty) : t=\infty = \boxed{0V}$

④ $v(t) = V_\infty + (V_0 - V_\infty)\, e^{-t/\tau}$

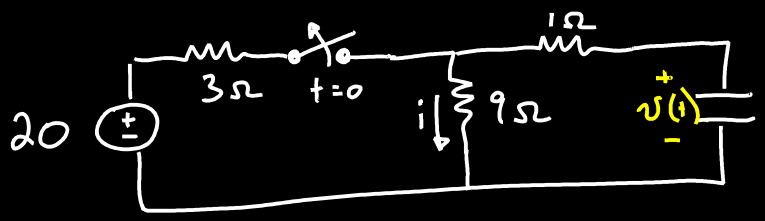
⑤ $i(t)$

⑥ All time



no switches
no cap, inductors
no v(t)

First Order Problem



Find i for all time

① $V_0 = v_c(t=0^-) \; ; \; t<0 = \boxed{15\,V}$

② τ : $0 < t < \infty = \boxed{\frac{1}{5}\,s}$

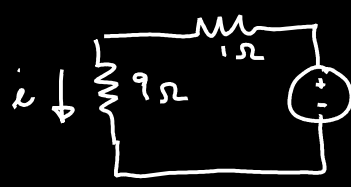
③ $V_\infty = v_c(t=\infty)$: $t=\infty = \boxed{0\,V}$

④ $v_c(t) = V_\infty + (V_0 - V_\infty)\,e^{-t/\tau} = \begin{cases} 15 & , \; t<0 \\ \boxed{15e^{-5t}\;V} & , \; t\geq 0 \end{cases}$

⑤ $i(t) = \begin{cases} \frac{5}{3}\,A & , \; t<0 \\ 1.5e^{-5t}\;A & , \; t\geq 0 \end{cases}$

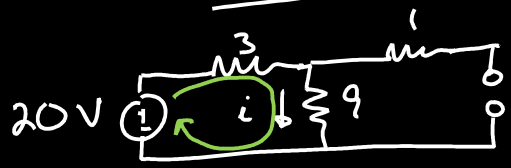
⑥ All time

$t \geq 0$



$i(t) = \frac{v(t)}{R} = \frac{15e^{-5t}}{10} = \boxed{1.5e^{-5t}\;A}$

$t < 0$



$i = \frac{20}{3+9} = \frac{20}{12} = \frac{5}{3}$