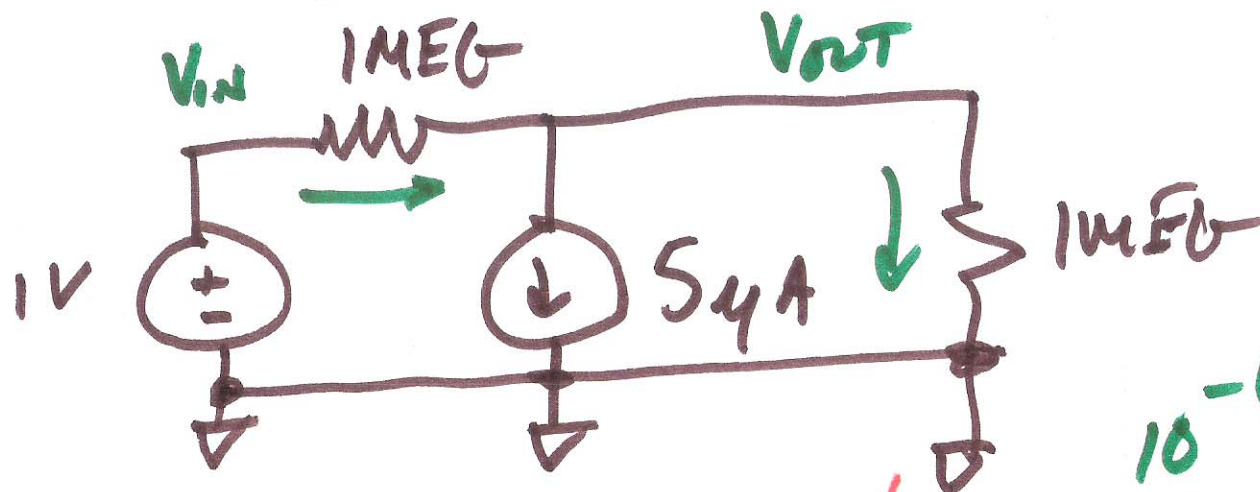


EE 421 / ECL 621

Not in Fall 2013

Lecture 2, Aug. 28, 2013



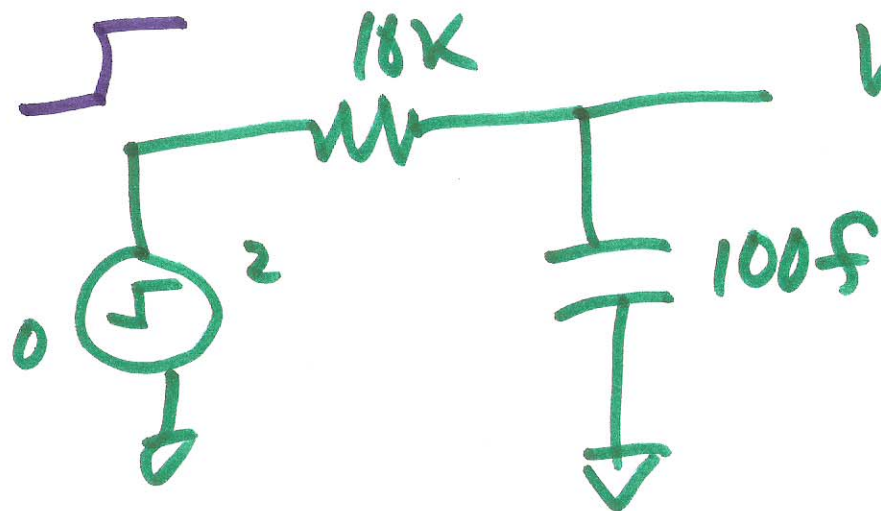
$$10^4 \left(\frac{1 - V_{out}}{1MEG} \right) = \left(5\mu A + \frac{V_{out}}{1MEG} \right) 10^6$$

$\swarrow$ 10^{-6} $\searrow$ 10^{-6}

$$1 - V_{out} = 5 + V_{out}$$

$$V_{out} = -\frac{6}{2} = -2V$$

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Graph of $V_{out}(t)$ vs t showing a step response. The output voltage rises from 0 to 2. The time constant τ is indicated by the time to reach approximately 63% of the final value.

$$V_{out}(t) = 2(1 - e^{-t/RC})$$

$$0.7 \cdot 10K \cdot 100f$$

$$0.7 \cdot 10^4 \cdot 10^2 \cdot 10^{-15}$$

$$0.7 \cdot 10^{-9}$$

$$t_d = 700ps$$

$$1 = 2(1 - e^{-t_d/RC})$$

$$\frac{1}{2} = 1 - e^{-t_d/RC}$$

$$1 - \frac{1}{2} = e^{-t_d/RC}$$

$$-\ln \frac{1}{2} = -\ln e^{-t_d/RC}$$

$$t_d \approx 0.7RC$$