$$\boxed{V_c = \mathcal{E}\left(1 - e^{-t/RC}\right).}$$

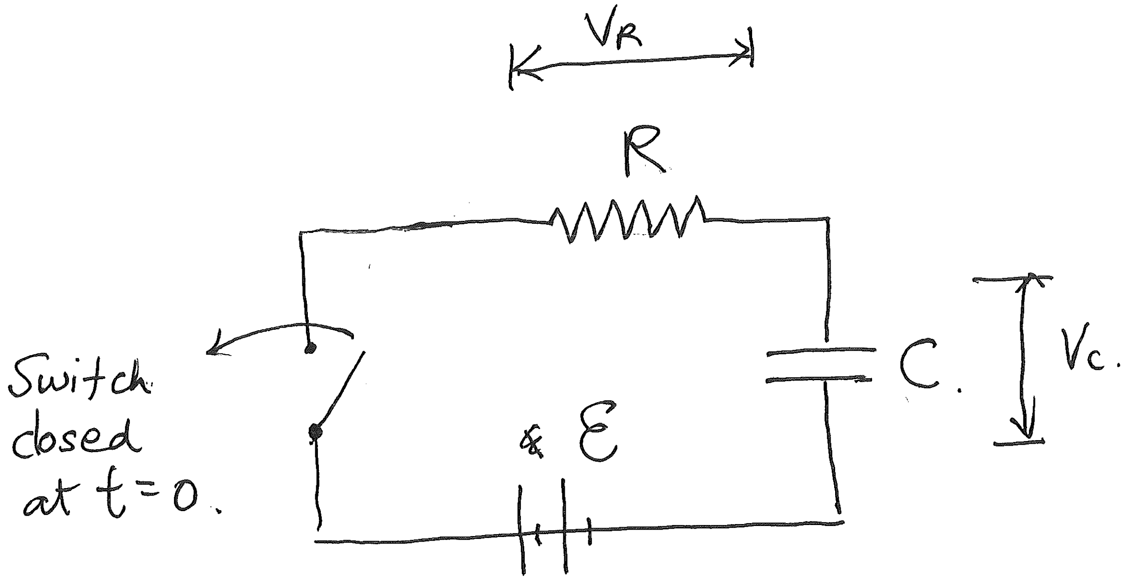
τ

Constant.

~~At what t, $V_c = \frac{1}{2}\mathcal{E}$?~~

At $t = 2RC$, $V_c = (\quad)\,\mathcal{E}$.

?



If R is larger, it takes longer/shorter time to charge the capacitor.

If C is larger, it takes longer/shorter time to charge the capacitor.

As time proceeds,

I increases/decreases.

Q increases/decreases.

V_R increases/decreases.

V_C increases/decreases.

RC is a value that determines how fast to change up the capacitor.

Bigger RC means Longer time.

$$[R] = \frac{V}{A} \qquad [C] = \frac{C}{V}$$

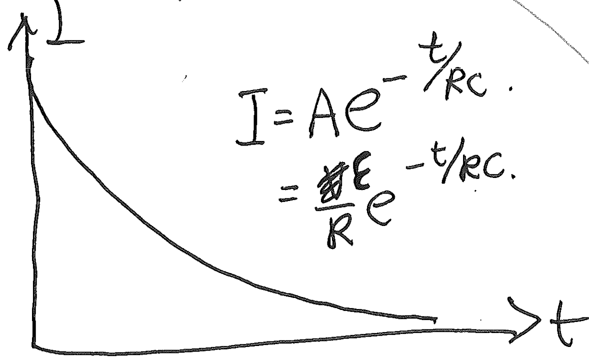
~~Coulomb~~

$$[RC] = \frac{V}{A} \cdot \frac{C}{V} = \frac{C}{A} = \frac{C}{\frac{C}{S}}$$

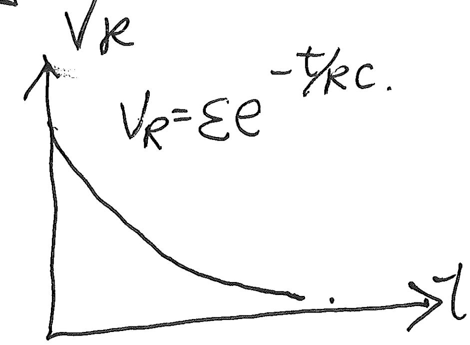
$$= S.$$

Ohm's law

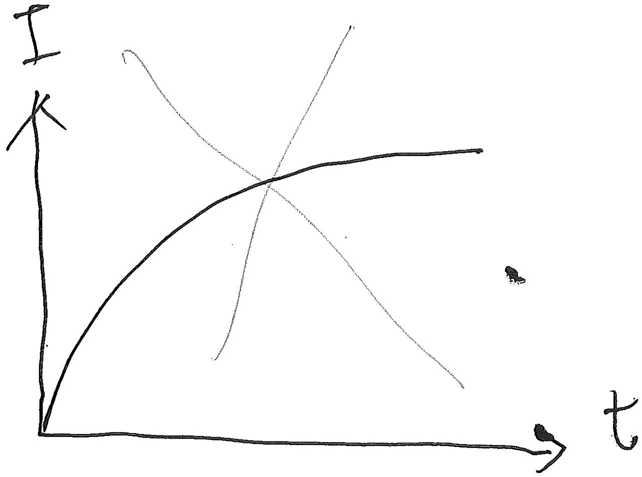
Charging



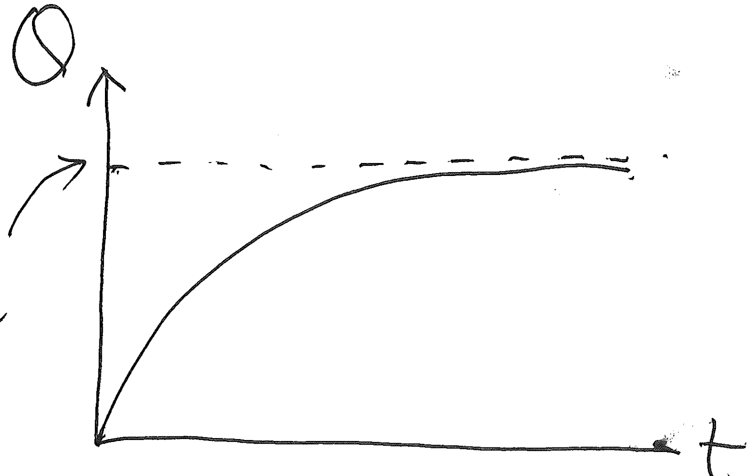
$$I = Ae^{-t/RC}.$$
$$= \frac{\cancel{\varepsilon}\varepsilon}{R}e^{-t/RC}.$$

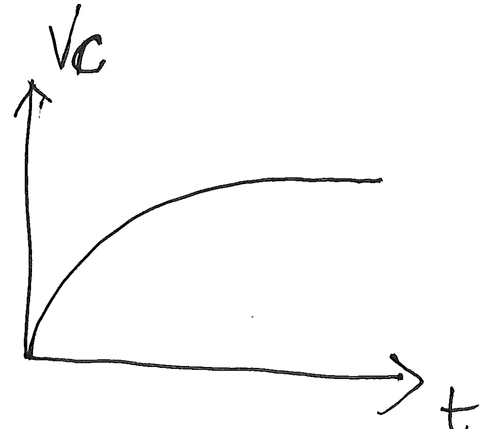


$$V_R = \varepsilon e^{-t/RC}.$$



Fully charged Q.

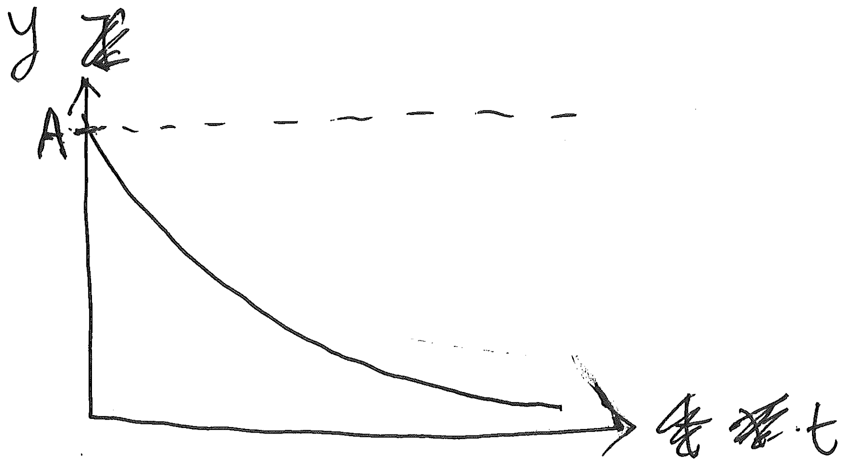




$$Q = C\varepsilon(1 - e^{-t/RC}).$$

$C = \frac{Q}{V}$ or $Q = CV$.

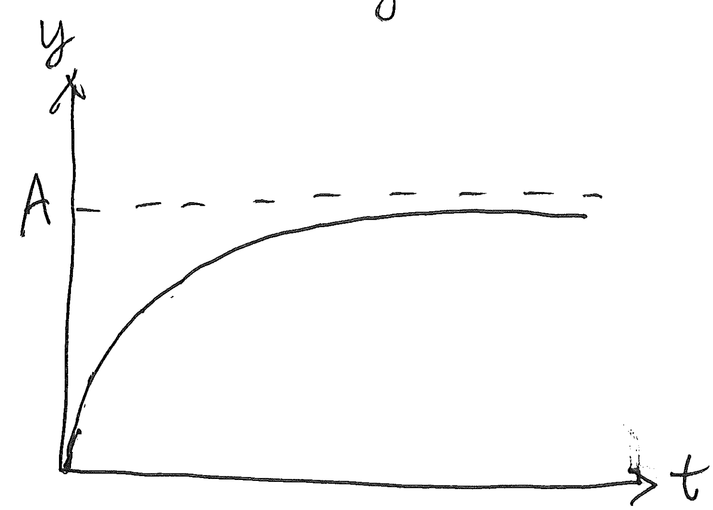
$\because V_C = \frac{Q}{C} \rightarrow V_C = \varepsilon(1 - e^{-t/RC}).$



$$y = Ae^{-\alpha t}$$

$y = A$ when $t = 0$.

Why NOT $e^{-\frac{t^2}{2\sigma^2}}$

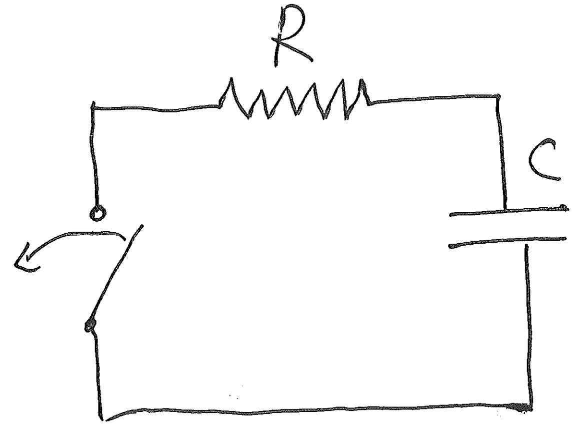


$$y = A(1 - e^{-\alpha t})$$

$y = A$ when $t = \infty$.

Discharging.

Switch closed at t=0.



Fully charge with $Q = Q_0$ at $t=0$

$$Q = Q_0 e^{-t/RC}.$$

$$V_C = \frac{Q_0}{C} e^{-t/RC}.$$

$$I = I_0 e^{-t/RC}. = \frac{Q_0}{RC} e^{-t/RC}.$$

$$\left(I_0 = \frac{V_C}{R}\right).$$

$$V_R = IR = \frac{Q_0}{C} e^{-t/RC}.$$

$V_c = 1\text{V}$ at $t = 10\text{s}$.

$$V_c = 385 e^{-t/RC}$$

$$1 = 385 e^{-10/RC}$$

CW