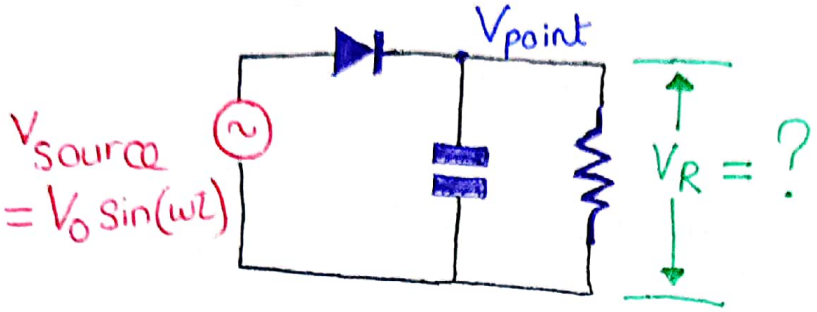
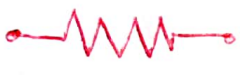
AC to DC Converter



Before solving, It is always a good idea to be familiar with individual component behavior.



→ Passive component.
→ Acts as a representation of load
→ $I = V_R / R$ = current

→ Passive component.
→ Tries to maintain voltage around it
→ Discharges due to load connected to it
→ Store charges by maintaining voltage between plates
→ Discharging

$$V_c = V_{initial}\, e^{-\left(\frac{\text{time passed in discharging}}{R_{load} C}\right)}$$

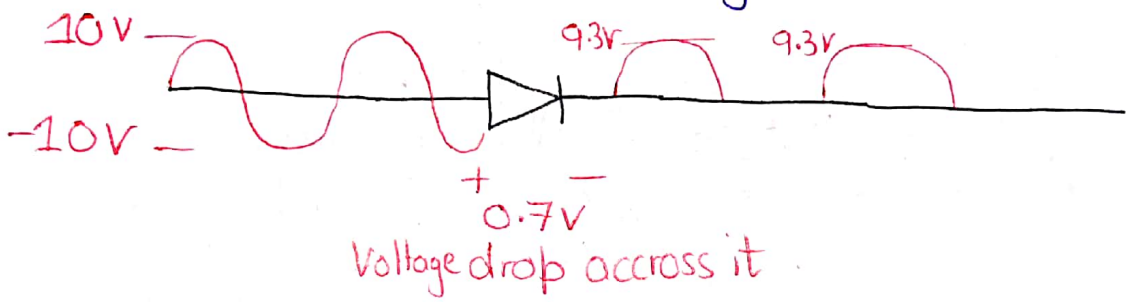
→ Charging

$$V_c = \left(1 - e^{-\left(\frac{\text{time passed in charging}}{R_{source} C}\right)}\right) V_{source}$$

→ Do not allow current to pass through when V_D is less than 0.7V

Value comes from the theory of semiconductors physics. That voltage is a function of semi-conductor doping.

→ Provides infinite resistance for voltage less than 0V.



Capacitor would charge if source voltage at that instant of time is greater than capacitor voltage.

Capacitor would discharge if source voltage is less than capacitor voltage, discharge would be via resistor.