Voltage Dividers: good for signals
poor for power conversion

Example: Convert $120V_{RMS} \rightarrow 12V_{RMS}$ to run 10Ω load.

2 methods

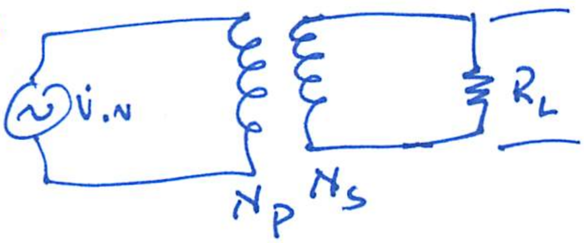
① Ideal transformer

$$V_{out} = \frac{N_S}{N_P} V_{in} \quad \text{AND} \quad P_{in} = P_{out}$$

② Ideal Voltage divider

$$V_{out} = \frac{R_1}{R_T} V_{in}$$

①



$N_p = 10 N_s$

$$V_{out} = \frac{N_S}{N_P} V_{in} = \frac{V_{in}}{10} = 12V_{RMS}$$

$$P_{out} = \frac{V_{RMS}^2}{R} = \frac{(12V_{RMS})^2}{10\Omega} = 14.4\frac{V^2}{\Omega} = 14.4W$$

$$P_{in} = P_{out} = 14.4W$$

2

$$V_{out} = \frac{R_L}{R_L + R_W} V_{in}$$

$R_W = 90\Omega$

$$P_{out} = \frac{(12V_{RMS})^2}{10\Omega} = 14.4W$$

$$P_{in} = \frac{(120V_{RMS})^2}{100\Omega} = 144W$$

$\Rightarrow$ 90% waste