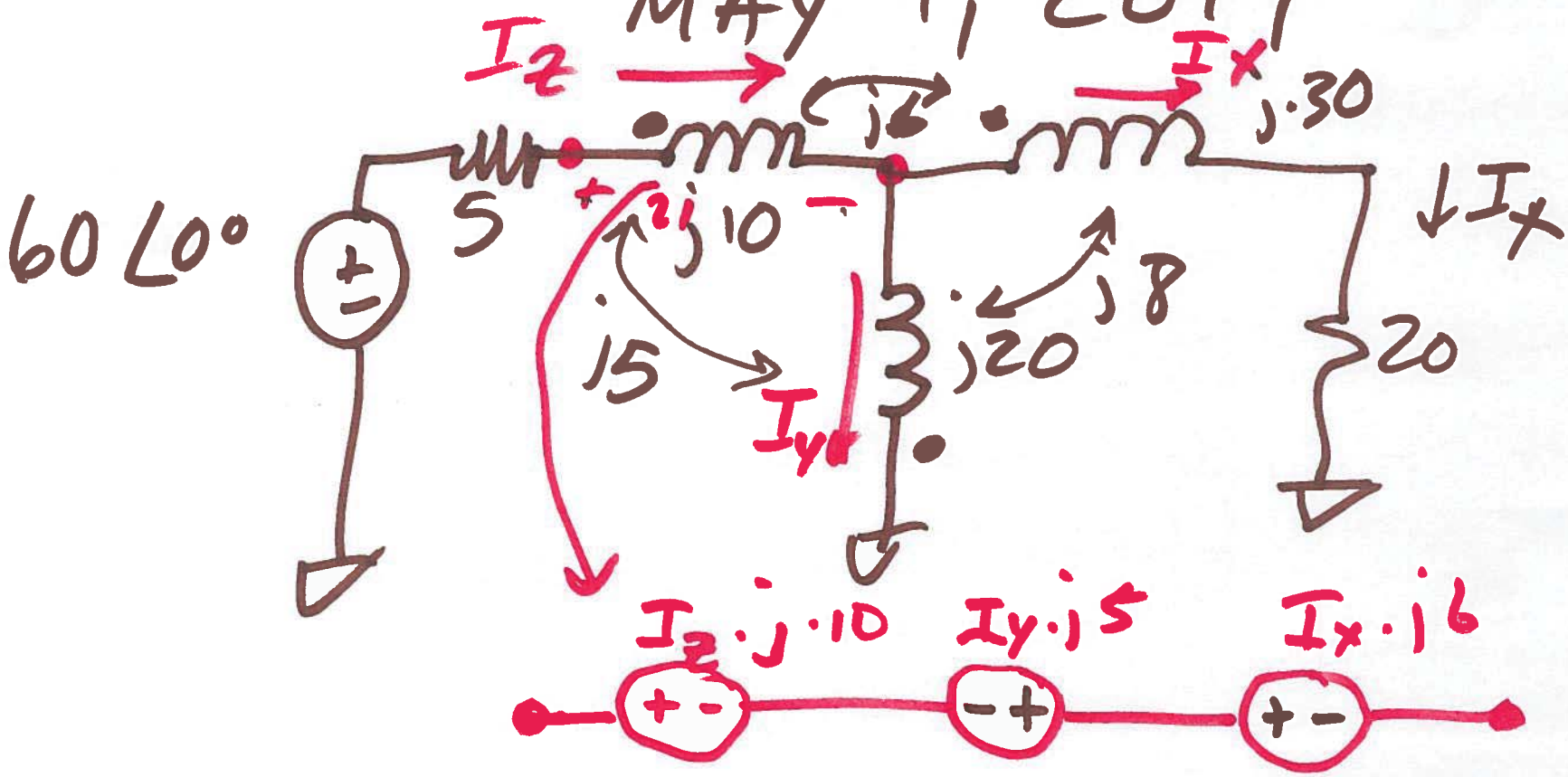
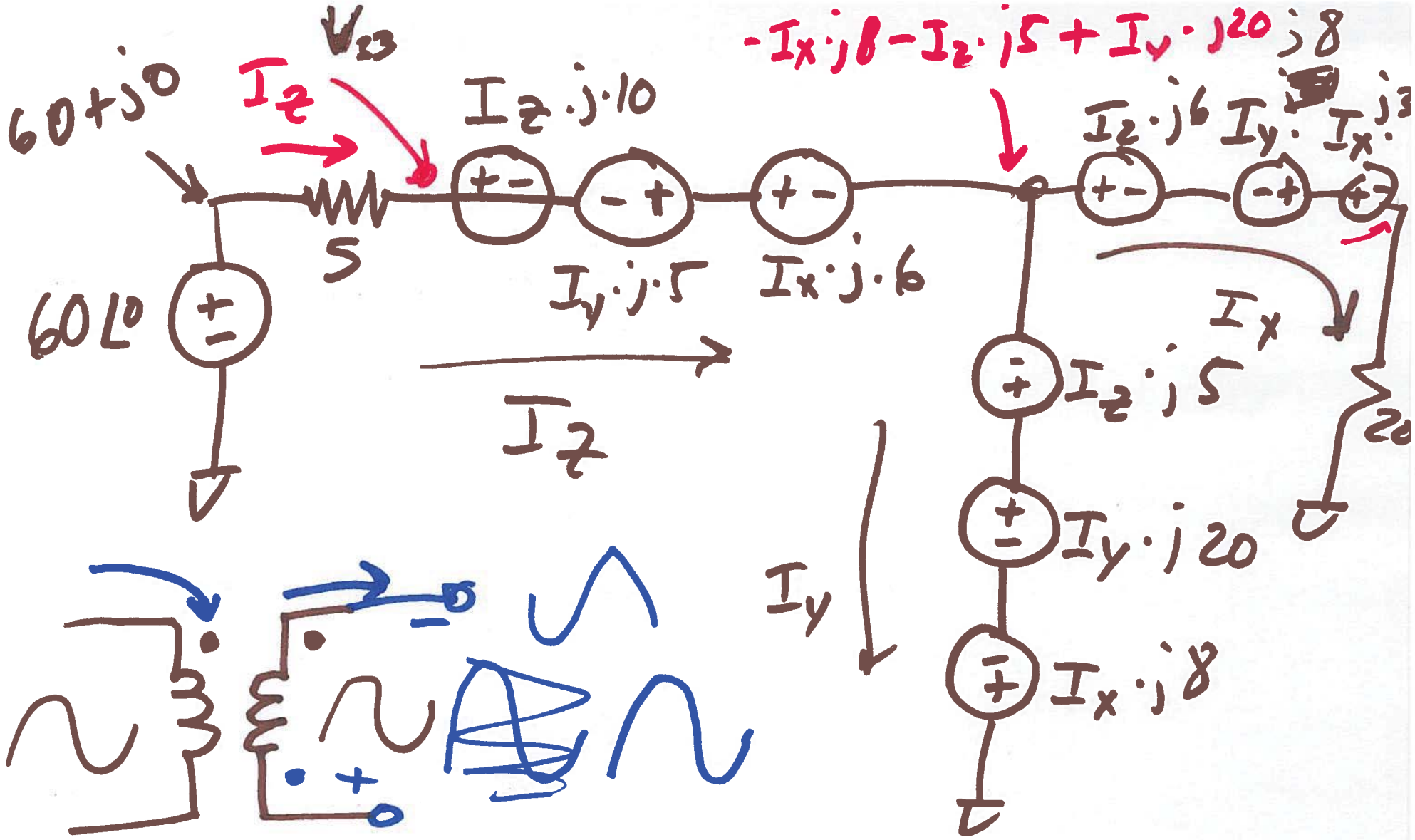
Circuits II
EE 221
Lecture 24
MAY 1, 2019




60+j0
V_{x3}
I_z
$I_z \cdot j \cdot 10$
$-I_x \cdot j8 - I_z \cdot j5 + I_y \cdot j20$
j8
$I_z \cdot j6$
$I_y \cdot$
$I_x \cdot$
5
$I_y \cdot j \cdot 5$
$I_x \cdot j \cdot 6$
60∠0°
I_x
I_z
$I_z \cdot j5$
$I_y \cdot j20$
I_y
$I_x \cdot j8$

$$V_{33} = I_z \cdot j10 - I_y \cdot j5 + I_x \cdot j6 - I_x \cdot j8 - I_z \cdot j5 + I_y \cdot j20$$

$$V_{33} = I_z(j10 - j5) + I_y(j20 - j5) + I_x(j6 - j8)$$

$$V_{33} = -I_x j2 + I_y \cdot j15 + I_z \cdot j5$$

$$I_z = \frac{60 + j0 + I_x j2 - I_y \cdot j15 - I_z \cdot j5}{5}$$

$$I_z(5 + j5) = 60 + I_x \cdot j2 - I_y \cdot j15$$

$$I_z = \frac{60 + I_x \cdot j2 - I_y \cdot j15}{5 + j5}$$

3)

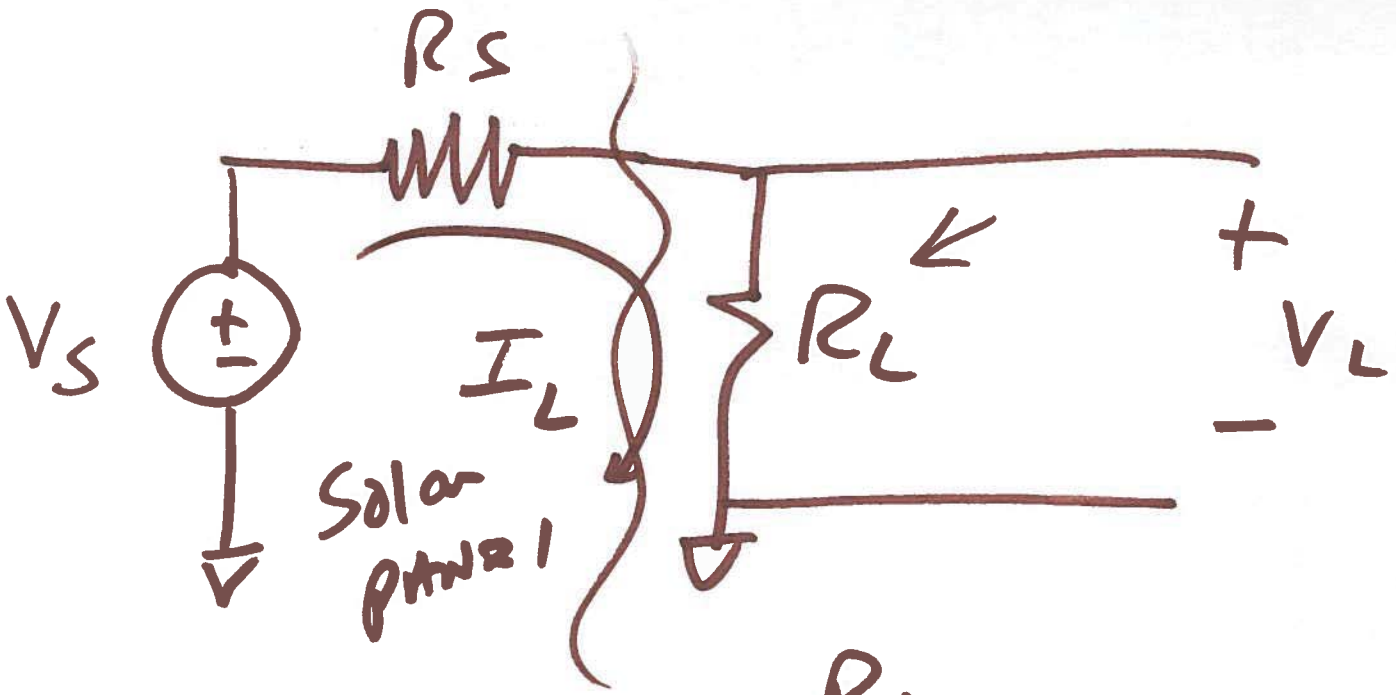
$$5+j5 = \sqrt{5^2+5^2}\angle(\tan^{-1}1$$

$$= 5\cdot\sqrt{2}\angle 45^\circ$$

$$I_z = \frac{60\angle 0}{5\sqrt{2}\angle 45^\circ} + I_x\cdot\frac{2\angle 90}{5\sqrt{2}\angle 45} + \frac{I_y\angle -90}{5\sqrt{2}\angle 45}$$

$$I_z = \frac{12}{\sqrt{2}}\angle -45 + I_x\frac{2}{5\sqrt{2}}\angle 45 + I_y\frac{3}{\sqrt{2}}\angle -135$$

$$I_y = I_z - I_x$$



$$V_L = V_S \cdot \frac{R_L}{R_L + R_S}$$

$$I_L = \frac{V_S}{R_S + R_L}$$

$$V_L\Big|_{power} = V_L \cdot I_L = V_S^2 \cdot \frac{R_L}{(R_S + R_L)^2}$$

$$P = V_S^2 \cdot \frac{R_L}{(R_S + R_L)^2}$$

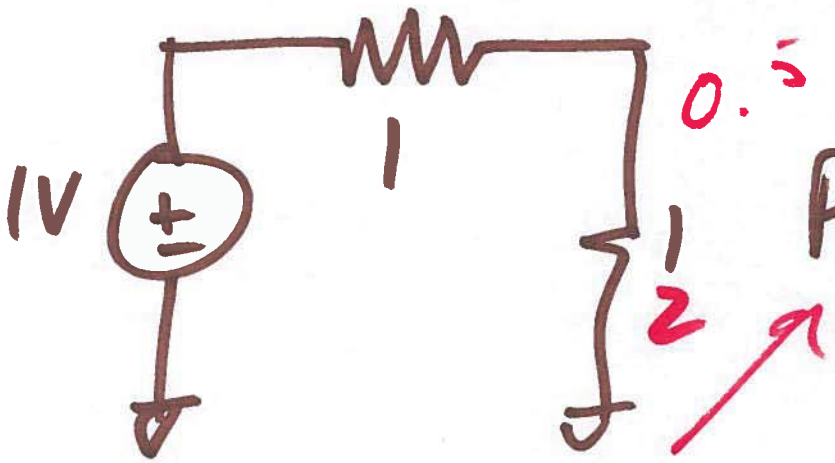
$$\frac{\delta P}{\delta R_L} = 0 = V_S^2 \frac{\delta}{\delta R_L} R_L \cdot (R_S + R_L)^{-2}$$

$$0 = (R_S + R_L)^{-2} + R_L(-2)(R_S + R_L)^{-3}$$

$$\frac{2R_L}{(R_S + R_L)^3} = \frac{1}{(R_S + R_L)^2}$$

$$2R_L \stackrel{?}{=} R_S + R_L$$

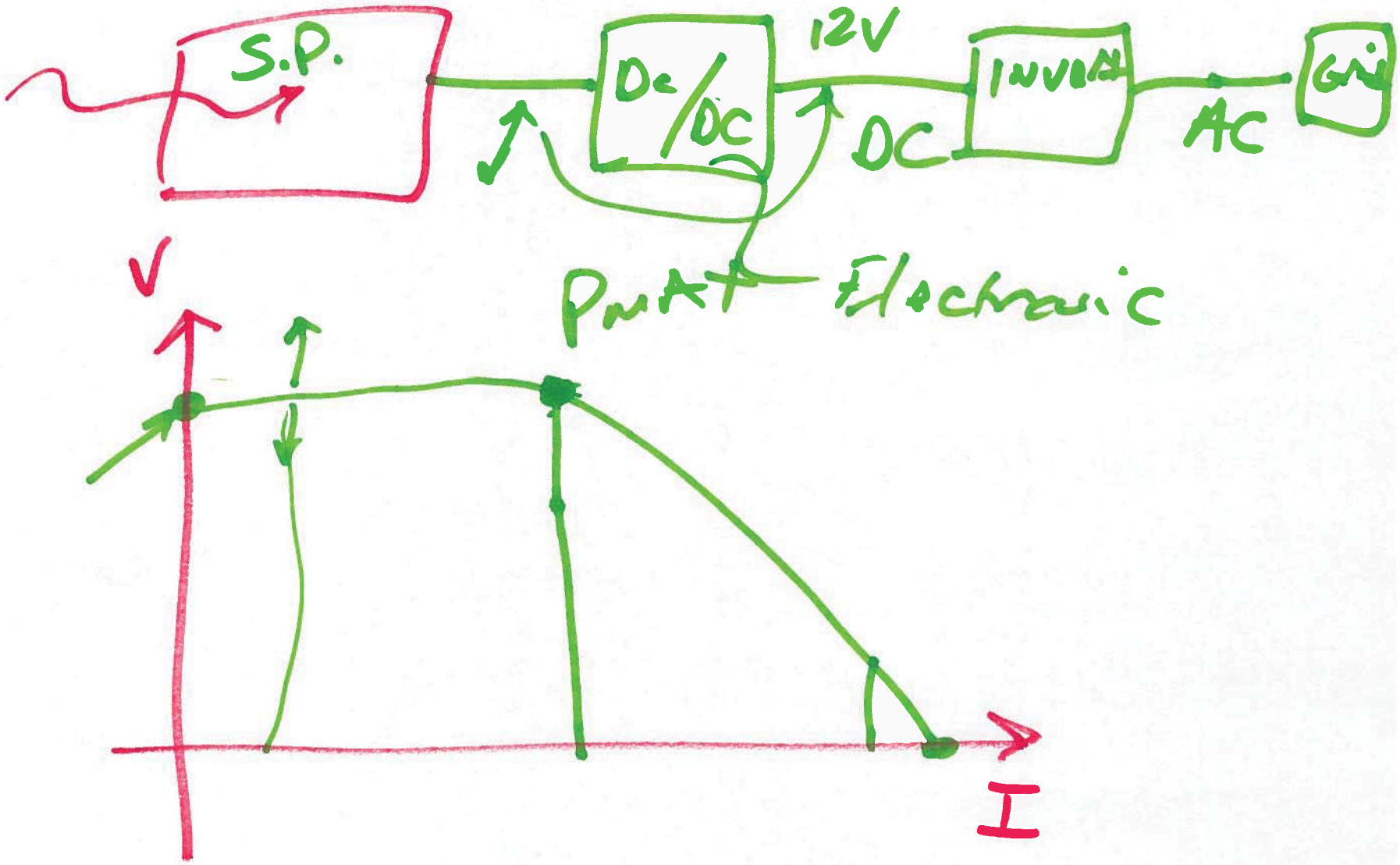
$$\boxed{R_L = R_S}$$



$$P_L = \frac{1}{2}V \cdot \frac{1}{2}A = \frac{1}{4}W$$

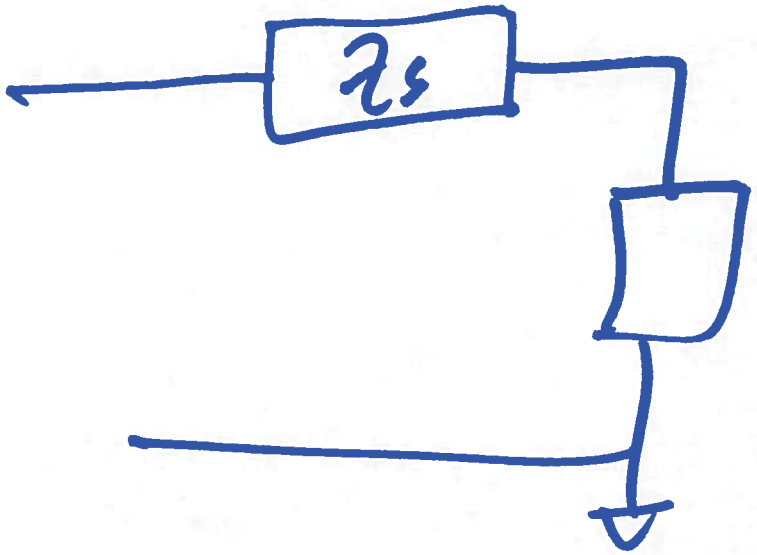
$$= \frac{2}{3}V \cdot \frac{1}{3}A = \frac{2}{9}W$$

$$= \frac{1}{3}V \cdot \frac{2}{3}A = \frac{2}{9}W$$


S.P.
DC/DC
12V
INVERTER
DC
AC
Grid
V
I

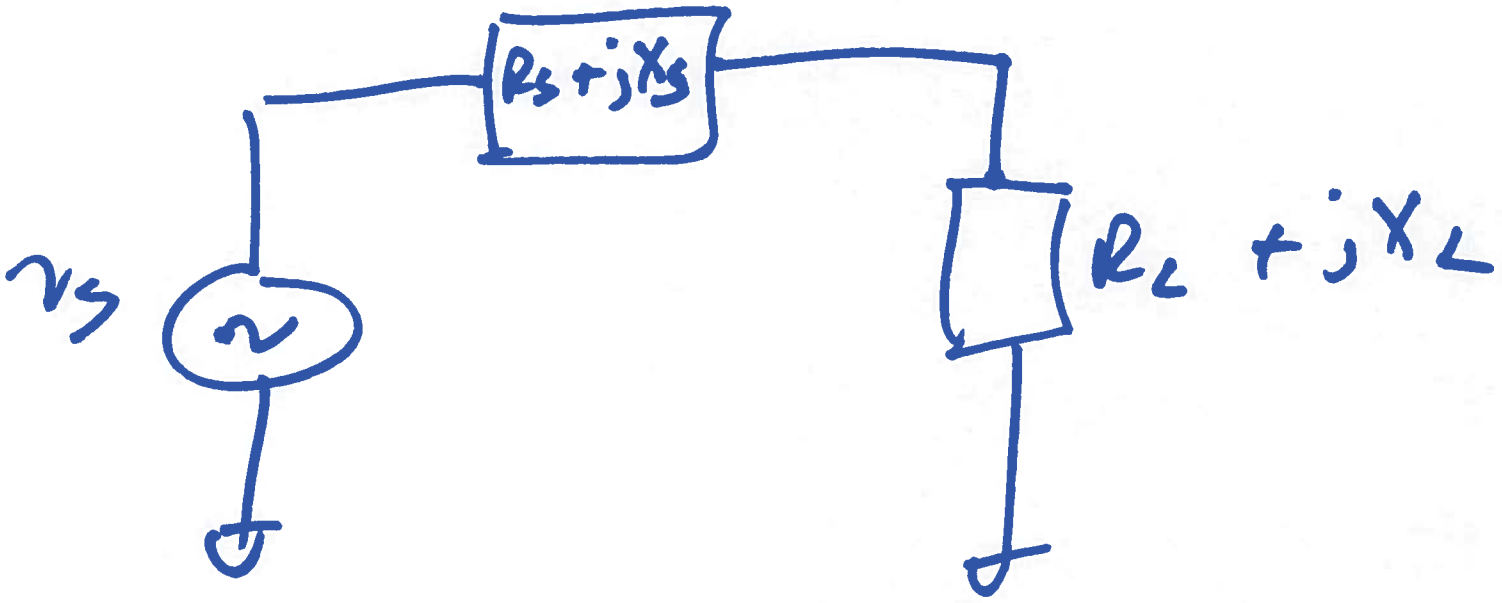
MAXimum power transfer

$Z_s = R \pm jX$



MAX power transfer

Z_L to complex conjugate of Z_s



MAX power transfer

$$R_S = R_L$$

$$jX_S = -jX_L$$