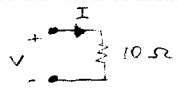
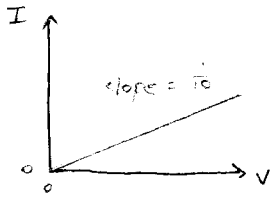
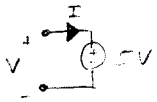
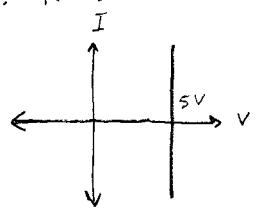
Ex 2.8) a. $I = \frac{1}{R} V \quad R = 10\,\Omega$



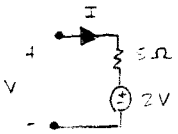


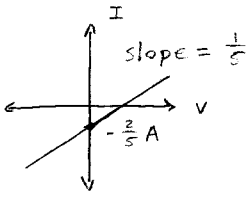
b. $R = 0$



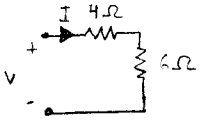


c. $V = IR + 2$





d. $R_{eff} = 10\,\Omega$



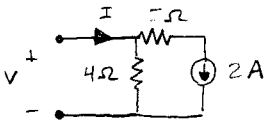
I-V characteristic same as a

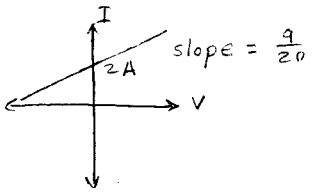
e. $I_1 = \frac{V}{4}$

$I_2 = 2 + \frac{V}{5}$

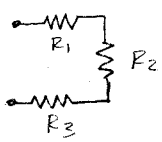
$I = 2 + \left(\frac{1}{4} + \frac{1}{5}\right)V$

$= 2 + \frac{9}{20}V$



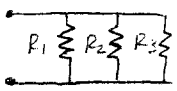


Pr 2.5) a.



$\boxed{R_{eff} = R_1 + R_2 + R_3}$

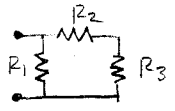
b.



$\frac{1}{R_{eff}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

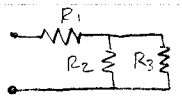
$\boxed{R_{eff} = R_1 R_2 R_3 / (R_1 R_2 + R_2 R_3 + R_1 R_3)}$

c.



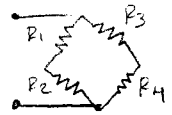
$\frac{1}{R_{eff}} = \frac{1}{R_1} + \frac{1}{R_2 + R_3}$

$\boxed{R_{eff} = R_1 (R_2 + R_3) / (R_1 + R_2 + R_3)}$

Pr 2.6) d. 

$$R_{eff} = R_1 + \frac{R_2 R_3}{R_2 + R_3}$$

$$\frac{1}{R'} = \frac{1}{R_2} + \frac{1}{R_3}$$

e. 

$$\frac{1}{R_{eff}} = \frac{1}{R_1 + R_2} + \frac{1}{R_3 + R_4} \qquad R_{eff} = (R_1+R_2)(R_3+R_4)/(R_1+R_2+R_3+R_4)$$

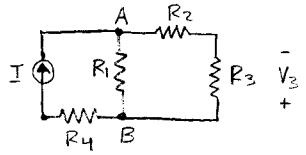
Pr 2.7) 

$$R' = \frac{R_2 R_3}{R_2 + R_3}$$

$$V_A = \frac{R'}{R_1 + R'} V$$

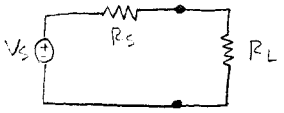
$$I_3 = -\frac{1}{R_3} V_A = -\frac{R'}{R_3} \frac{V}{R_1 + R'}$$

$$= \boxed{-R_2 V / (R_1(R_2+R_3) + R_2 R_3)}$$

Pr 2.8) 

$$V_A - V_B = I R_{eff} = I \left(\frac{R_1(R_2+R_3)}{R_1+R_2+R_3} \right) \qquad \frac{1}{R_{eff}} = \frac{1}{R_1} + \frac{1}{R_2+R_3}$$

$$V_3 = -\frac{R_3}{R_2+R_3}(V_A - V_B) \longrightarrow \boxed{V_3 = \frac{-R_1 R_3}{R_1+R_2+R_3} I}$$

Pr 2.11) 

a. $P_L = V_L^2 / R_L \qquad V_L = \frac{R_L}{R_s+R_L} V_s$

$= \frac{R_L}{(R_s+R_L)^2} V_s^2$ ← decreases w/ increasing R_s

$P_{L,max} = \boxed{V_s^2 / R_L}$ for R_L fixed

b. $P_L = \frac{R_L}{(R_s+R_L)^2} V_s^2$

$dP_L/dR_L = \left([(R_s+R_L)^2 - 2R_L(R_s+R_L)] / (R_s+R_L)^2 \right) V_s^2 = 0$

$R_s^2 + R_L^2 + 2R_sR_L - 2R_sR_L - 2R_L^2 = 0$

$R_s^2 = R_L^2 \longrightarrow \boxed{R_s = R_L} \qquad \boxed{P_{L,max} = \frac{1}{4} V_s^2 / R_L}$ for R_s fixed

c. $P_S = \left(\frac{R_s}{R_s+R_L} V_s \right)^2 / R_s$

$= \frac{R_s}{(R_s+R_L)^2} V_s^2$ $R_s = R_L$ for max power dissipated in R_L

$= \frac{1}{4} V_s^2 / R_L$

$= \boxed{P_L}$