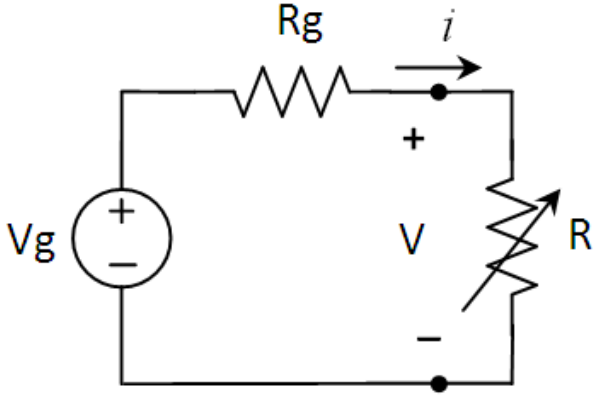
INGENIERIA
UNIVERSIDAD DE LOS ANDES
MÉRIDA VENEZUELA

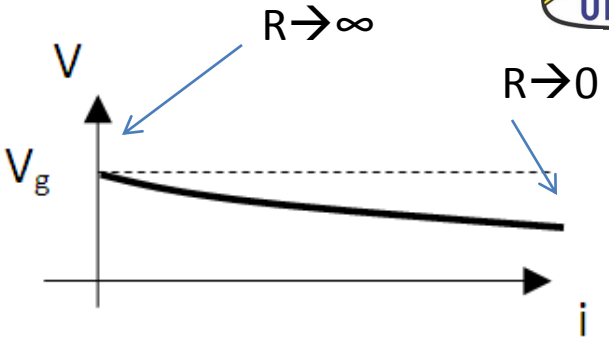
Fuentes reales
y
Transformación Delta-estrella

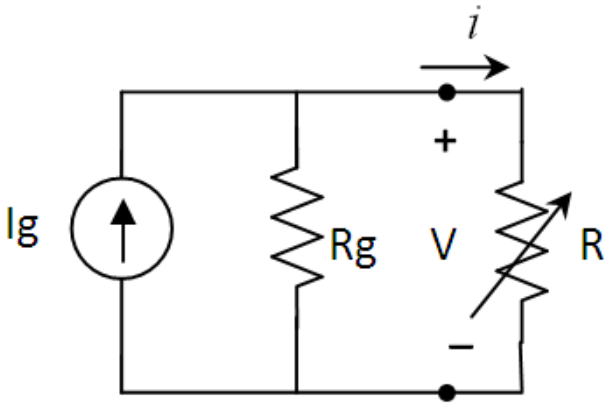
Prof. Gerardo Ceballos

Fuentes reales

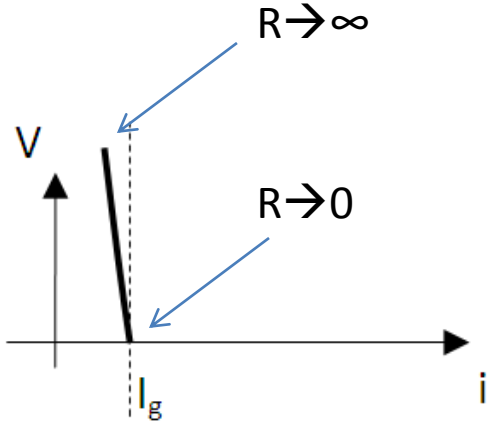


$$V = V_g \frac{R}{R_g + R}$$

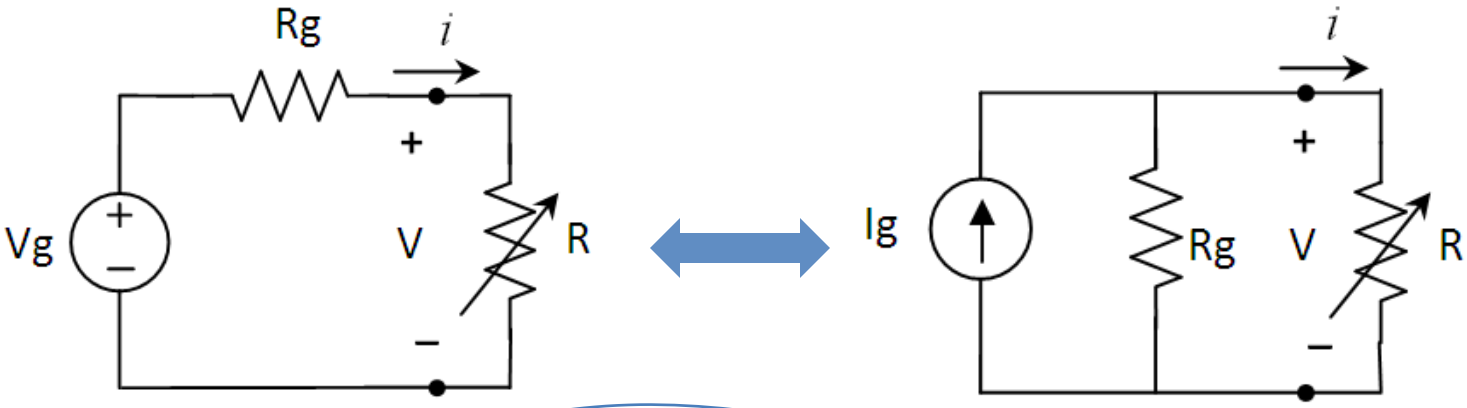




$$I = I_g \frac{R_g}{R_g + R}$$



Transformación de fuentes

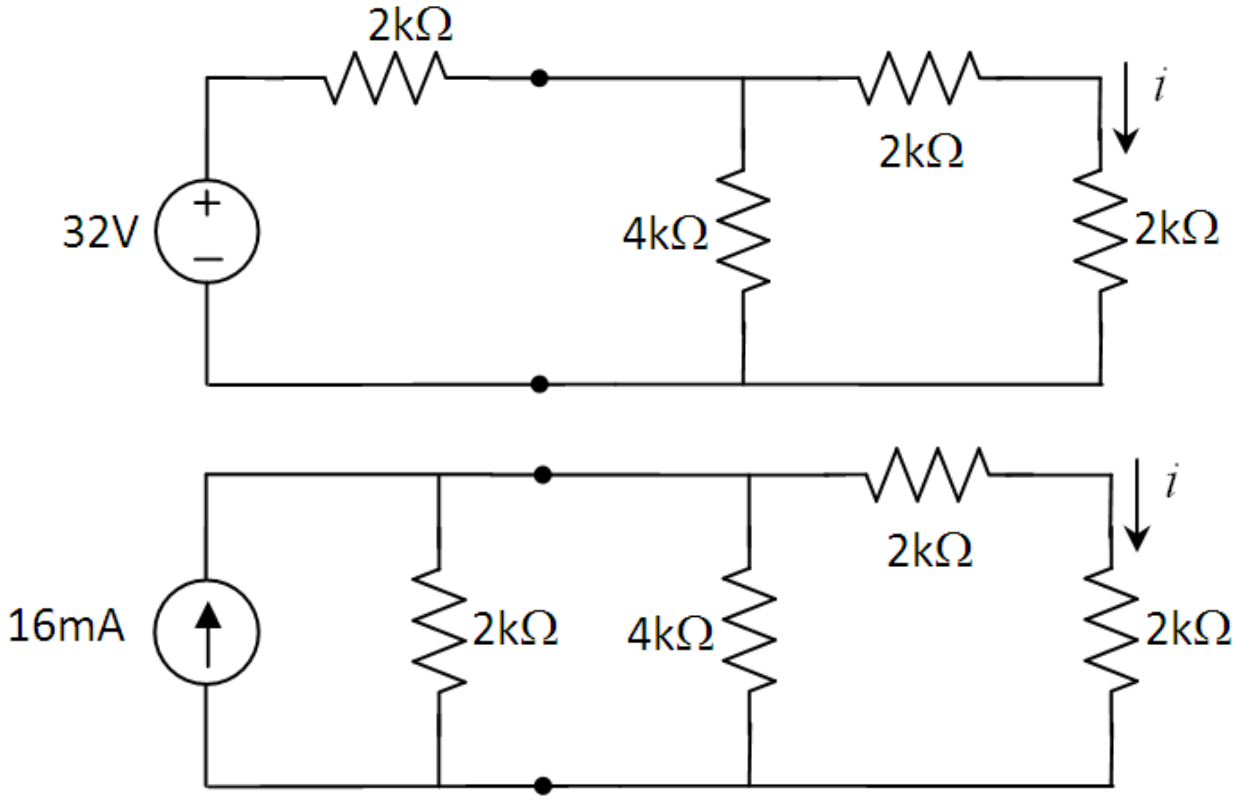


$$V = V_g \frac{R}{R_g + R} \qquad V = I_g \frac{R_g R}{R_g + R}$$

$$I = \frac{V_g}{R_g + R} \qquad I = \frac{I_g R_g}{R_g + R}$$

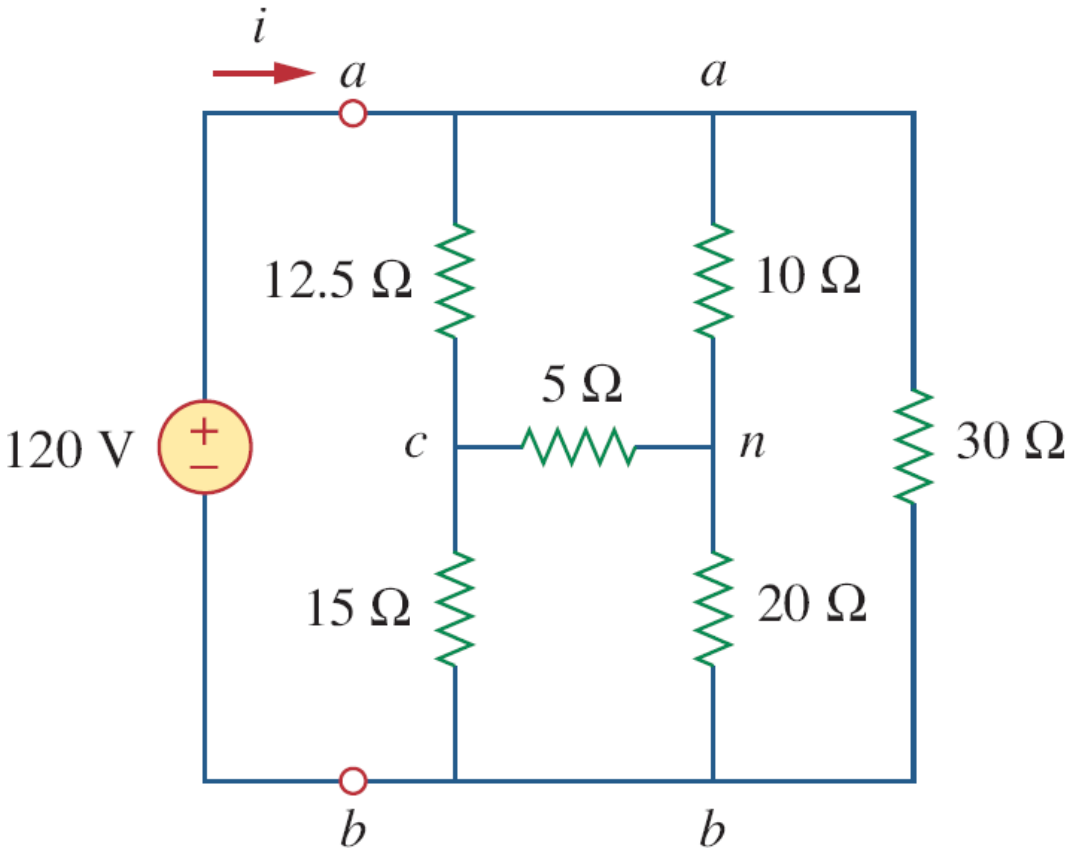
Transformación de fuentes

- Ejemplos:

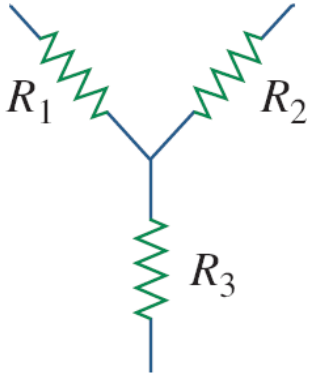


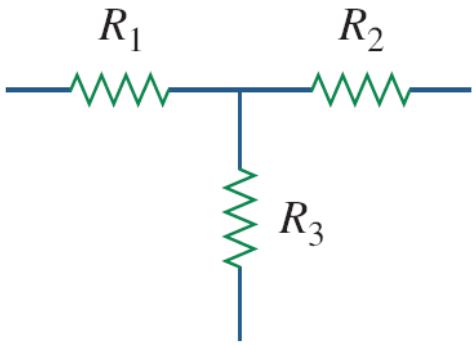
Transformación Delta-estrella

- ¿Cómo reducir el siguiente circuito?

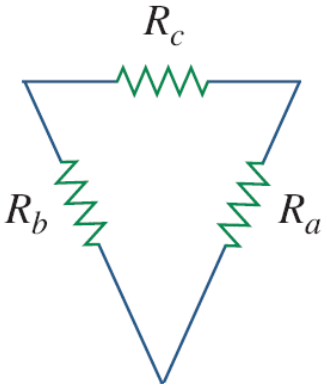


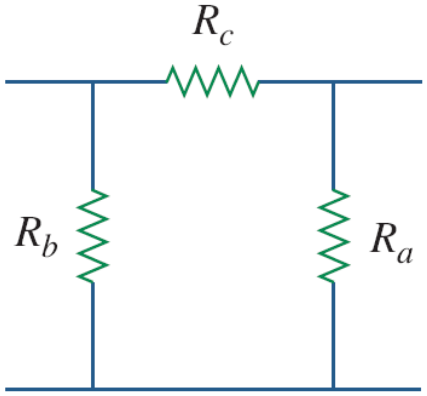
- Y, estrella ó T



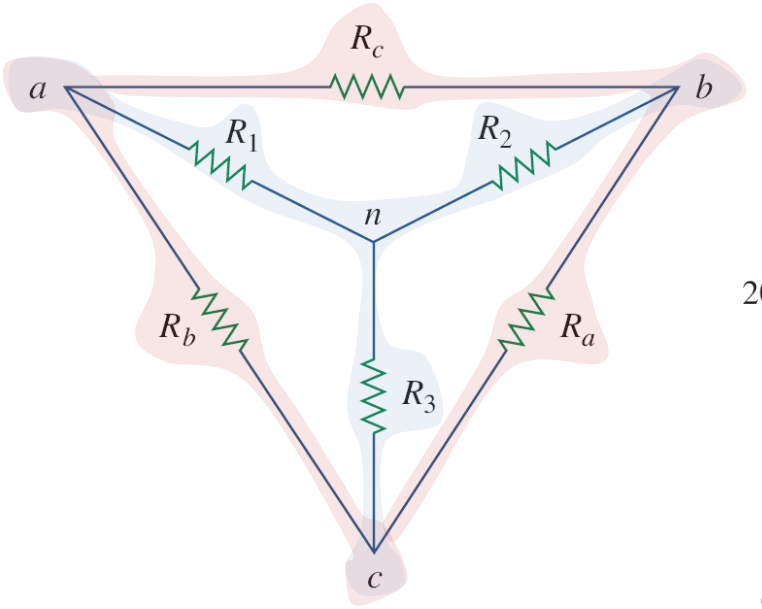


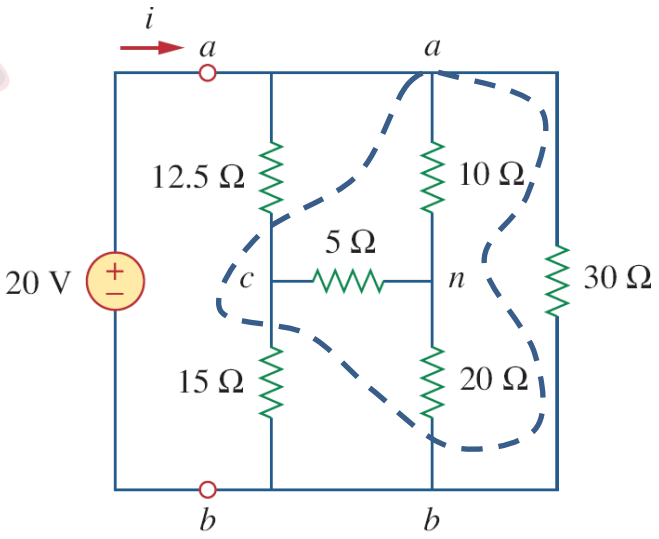
- Delta ó Pi

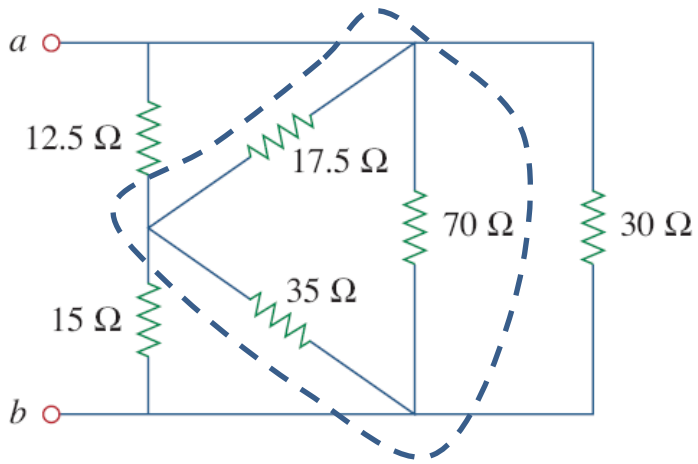




Transformación Delta-estrella

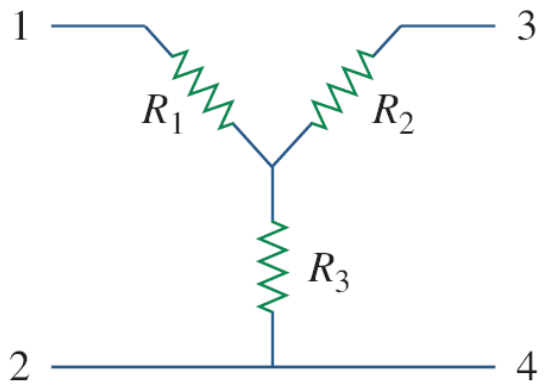


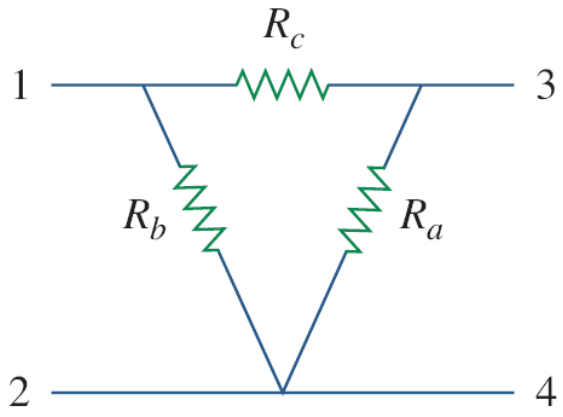




Transformación Delta-estrella

- ¿Cómo se consiguen las ecuaciones de conversión de una a la otra?





$$R_{12}(\mathrm{Y}) = R_1 + R_3$$

$$R_{12}(\Delta) = R_b \parallel (R_a + R_c)$$

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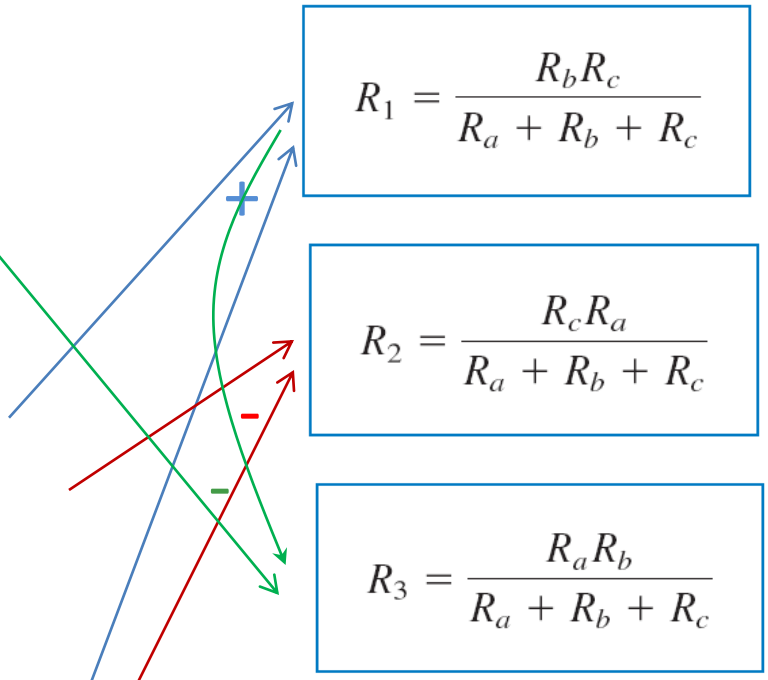
$$R_{12}(\Delta) = R_b \parallel (R_a + R_c)$$

$$R_{12} = R_1 + R_3 = \frac{R_b(R_a + R_c)}{R_a + R_b + R_c}$$

$$R_{13} = R_1 + R_2 = \frac{R_c(R_a + R_b)}{R_a + R_b + R_c}$$

$$R_{34} = R_2 + R_3 = \frac{R_a(R_b + R_c)}{R_a + R_b + R_c}$$

$$R_1 - R_2 = \frac{R_c(R_b - R_a)}{R_a + R_b + R_c}$$

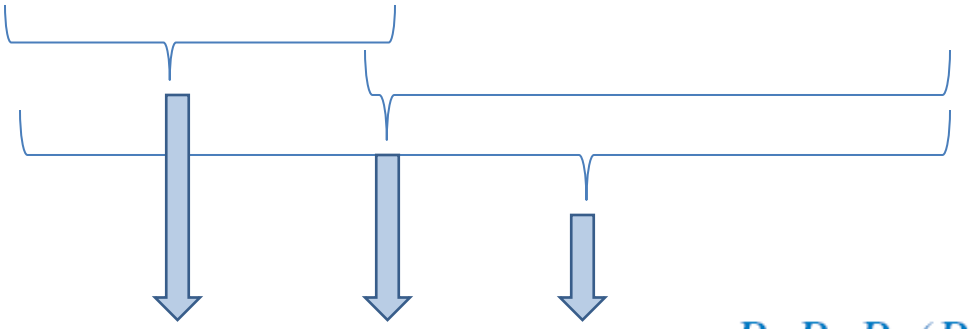


$$R_1 = \frac{R_b R_c}{R_a + R_b + R_c}$$

$$R_2 = \frac{R_c R_a}{R_a + R_b + R_c}$$

$$R_3 = \frac{R_a R_b}{R_a + R_b + R_c}$$

$$R_1 = \frac{R_b R_c}{R_a + R_b + R_c} \qquad R_2 = \frac{R_c R_a}{R_a + R_b + R_c} \qquad R_3 = \frac{R_a R_b}{R_a + R_b + R_c}$$

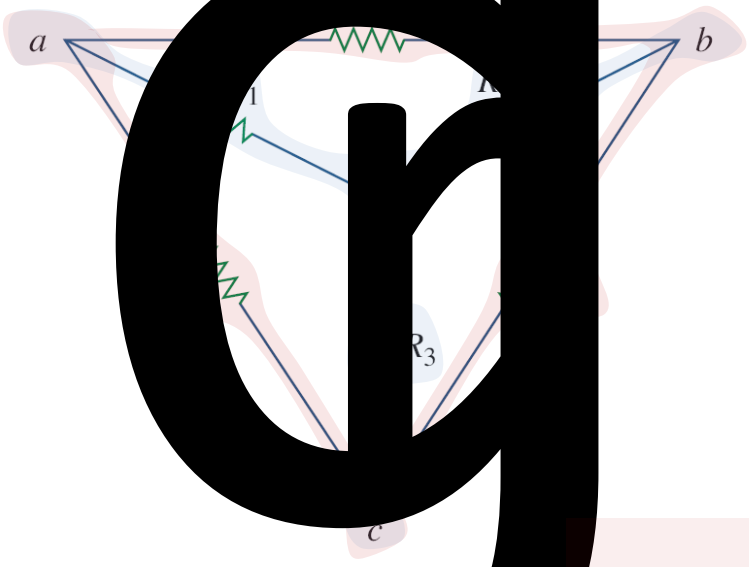


$$R_1 R_2 + R_2 R_3 + R_3 R_1 = \frac{R_a R_b R_c (R_a + R_b + R_c)}{(R_a + R_b + R_c)^2} = \frac{R_a R_b R_c}{R_a + R_b + R_c}$$

R_3

$$R_a = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_1} \qquad R_b = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_2} \qquad R_c = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_3}$$

Transformación Delta-estrella



$$R_1 = \frac{R_b R_c}{R_a + R_b + R_c}$$

$$R_2 = \frac{R_c R_a}{R_a + R_b + R_c}$$

$$R_3 = \frac{R_a R_b}{R_a + R_b + R_c}$$

$$R_a = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_1}$$

$$R_b = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_2}$$

$$R_c = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_3}$$

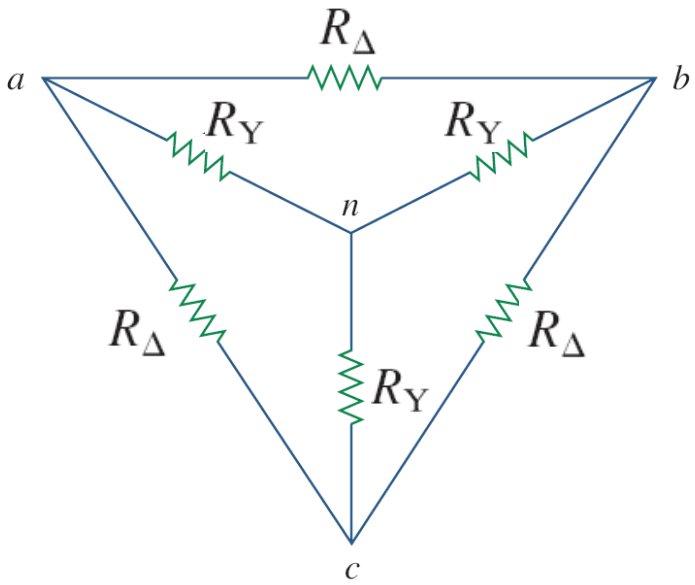
$$G_a = \frac{G_2 G_3}{G_1 + G_2 + G_3}$$

$$G_b = \frac{G_1 G_3}{G_1 + G_2 + G_3}$$

$$G_c = \frac{G_1 G_2}{G_1 + G_2 + G_3}$$

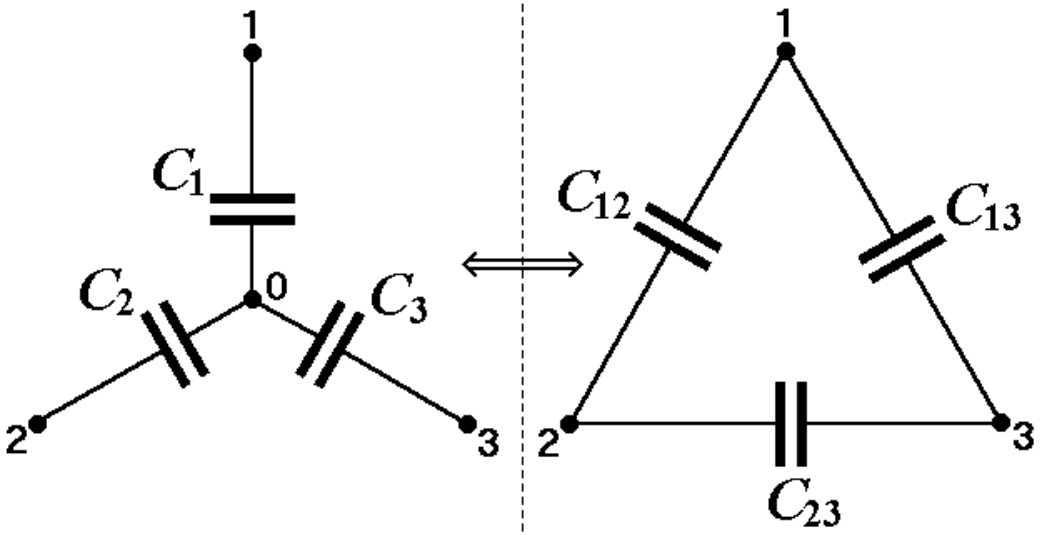
Transformación Delta-estrella

- Balanceado:



$$R_Y = \frac{R_\Delta}{3} \qquad \text{or} \qquad R_\Delta = 3R_Y$$

- Para inductores y capacitores



Inductores: igual que las resistencias

Ejemplo:

$$\frac{1}{C_1} = \frac{\frac{1}{C_{12}}\frac{1}{C_{13}}}{\frac{1}{C_{12}}+\frac{1}{C_{13}}+\frac{1}{C_{23}}}$$

Transformación Delta-estrella

- Reduzcámoslo