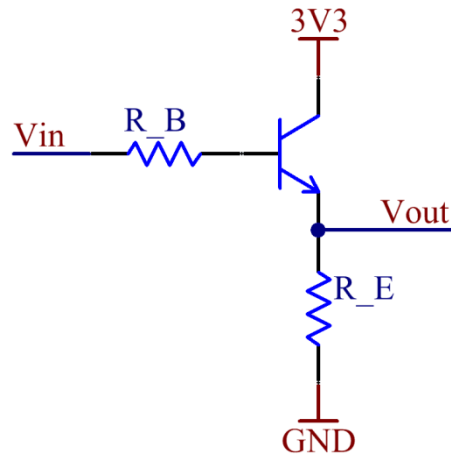


Find the DC transfer function of an npn common collector circuit:



$$I_E = (\beta + 1)I_B$$

$$\frac{I_E}{I_B} = (\beta + 1)$$

$$\frac{\frac{V_E}{R_E}}{\frac{V_{in} - V_B}{R_B}} = (\beta + 1)$$

$$\frac{V_E}{R_E} \times \frac{R_B}{V_{in} - V_B} = (\beta + 1)$$

$$\frac{R_E}{V_E} \times \frac{V_{in} - V_B}{R_B} = \frac{1}{(\beta + 1)}$$

$$\frac{R_E}{V_{out}} \times \frac{V_{in} - (0.7 \text{ V} + V_{out})}{R_B} = \frac{1}{(\beta + 1)}$$

$$R_E(V_{in} - 0.7 \text{ V} - V_{out}) = V_{out} \frac{R_B}{(\beta + 1)}$$

$$R_E(V_{in} - 0.7 \text{ V}) = V_{out} \frac{R_B}{(\beta + 1)} + V_{out} R_E$$

$$V_{in} - 0.7 \text{ V} = V_{out} \left( 1 + \frac{1}{(\beta + 1)} \frac{R_B}{R_E} \right)$$

$$V_{out} = \frac{V_{in} - 0.7 \text{ V}}{\left( 1 + \frac{1}{(\beta + 1)} \frac{R_B}{R_E} \right)}$$