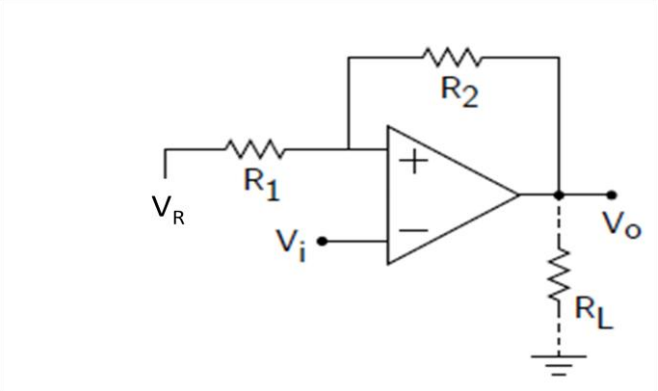
EE 101 Tutorial 9: Op-Amp Feedback Circuits

1. Consider the following Schmitt trigger circuit. Assume V_o=+/- V_{sat}, plot the V_o vs V_i characteristic, and find the threshold voltages in terms of R_1, R_2 and V_{sat}.

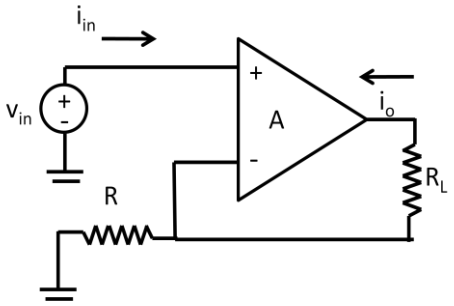


2. The op-amp circuit below is an example of series-series feedback.

(i) Assuming infinite A, R_{in}=∞, R_o=0 Ω for the op-amp, find the gain A_F of the amplifier?

(ii) Assume finite gain A, finite R_{in}, R_o=0 Ω for the op-amp. For R_{in}>>R show that the input resistance R_{iF} of the amplifier is given by, $R_{iF} = \frac{v_{in}}{i_{in}} \approx \left(1 + \frac{AR}{R+R_L}\right) R_{in}$.

(iii) Assume finite gain A, finite R_{in}, non-zero $R_o$for the op-amp. For R_{in}>>R show that, $R_{oF} \approx (1 + A)R + R_o$.



3. The op-amp in the circuit below is ideal.

(a) Find the feedback transfer function β and oscillation frequency ω_o.

(b) Find the relationship between R_1 and R_2 for which the oscillation occurs.