

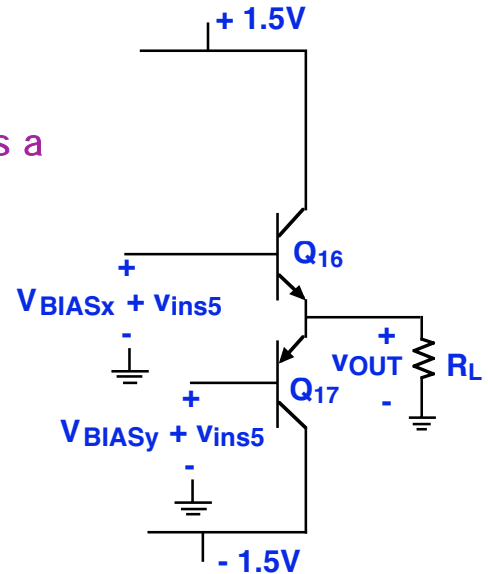
Fall 2003 Design Problem Analysis

The fourth stage voltage gain:

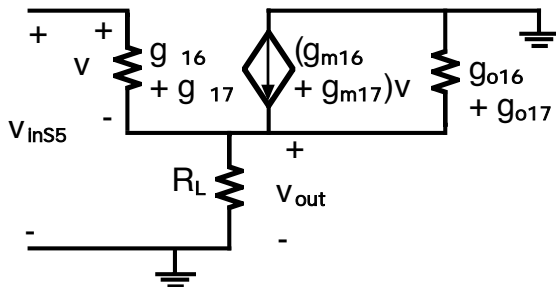
This follower stage sees a large load and has a voltage gain that is essentially 1: $A_{v4} \approx 1$

The fifth stage voltage gain:

Because this follower sees a load of only 100 Ohms (R_L) its gain may be less than one. To analyze it we begin by recognizing that Q_{16} and Q_{17} both see the same input signal, albeit riding on different DC biases:



The L.E.C. is:



We find that g_{o16} and g_{o17} can be neglected.

And the gain is:

$$A_{v5} \approx \frac{[g_{\pi16} + g_{\pi17} + g_{m16} + g_{m17}]R_L}{1 + [g_{\pi16} + g_{\pi17} + g_{m16} + g_{m17}]R_L}$$

$$\approx \frac{[g_{m16} + g_{m17}]R_L}{1 + [g_{m16} + g_{m17}]R_L} = \frac{R_L}{R_L + kT/2qI_{C16}}$$

Retaining g_{16} and g_{17} will give a slightly higher value for A_{v5} .