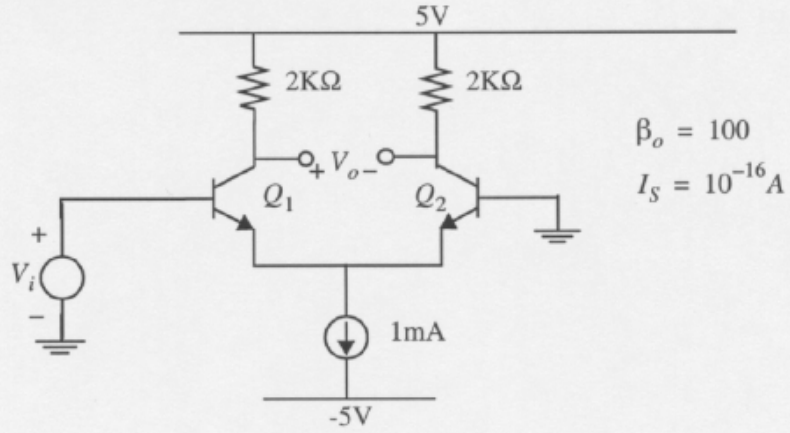
UNIVERSITY OF CALIFORNIA
College of Engineering
Department of Electrical Engineering
and Computer Sciences

Example Problem Set 1 **EECS 142**

1. A differential amplifier is shown below.



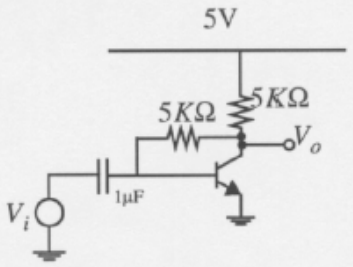
$\beta_o = 100$
$I_S = 10^{-16}A$

a) Use .DC in SPICE to compute the DC transfer characteristic from V_i to V_0 for $V_i = \pm 200mV$ and use TF to obtain the small-signal voltage gain and input resistance. Verify with hand calculations.

b) Calculate HD_3 in V_0 for $\hat{V}_i = 4mV$ and then 8mV o-peak sinusoidal. Compare with .TRAN and .FOURIER in SPICE.

c) Calculate the input interfering signal required to produce $IM_3 = 2\%$.

2. An amplifier is shown below.



$\beta_0 = 100$
$I_S = 10^{-16}A$

a) Calculate small-signal input resistance and voltage gain at f = 1MHz, and check with .AC on SPICE.

b) Calculate HD_2 and HD_3 in V_0 for $\hat{V}_i = 4mV$ and then 8mV o-peak sinusoidal. Compare with .TRAN and .FOURIER in SPICE. Use f = 1 MHz.

c) Calculate the input interfering signal required to produce $IM_3 = 2\%$.