1. The above circuit operates in linear mode. Derive a symbolic expression for $v_o$. The expression must contain not more than the parameters $i_{s1}$, $i_{s2}$, $R_1$, $R_2$, and $R_3$.

2. a) If $i_{s1} = 0 \mu A$, find the value of $R_3$ that will yield an output voltage of $v_o = 1 V$ when $i_{s2} = 10 \mu A$.

   b) Derive a symbolic expression for $v_o$ in terms of common mode and differential input currents:

   $$i_{\Sigma} = \frac{i_{s1} + i_{s2}}{2} \quad \text{and} \quad i_{\Delta} = \frac{i_{s1} - i_{s2}}{2}$$

   The expression must contain not more than the parameters $i_{\Sigma}$, $i_{\Delta}$, $R_1$, $R_2$, and $R_3$. Write the expression as $i_{\Sigma}$ times a term plus $i_{\Delta}$ times a term.

   Hint: start by writing $i_{s1}$ and $i_{s2}$ in terms of $i_{\Sigma}$ and $i_{\Delta}$:

   $$i_{s1} = i_{\Sigma} + i_{\Delta} \quad \text{and} \quad i_{s2} = i_{\Sigma} - i_{\Delta}$$

3. If $i_{\Delta} = 0$ and $R_1 = R_2$, write a formula for the current flowing from left to right in $R_3$ as a function of not more (and possibly less) than the following terms: $i_{\Sigma}$, $R_1$, $R_2$, and $R_3$. 

Rail voltages = ±10 V
4. Find the Thevenin equivalent of the above circuit relative to terminals a and b.

5. a) If we attach $R_L$ to terminals a and b, find the value of $R_L$ that will absorb maximum power.

   b) Calculate the value of that maximum power absorbed by $R_L$. 