Use the following parameters:

- Assume all (W/L)=2, unless otherwise shown in the circuit as $\frac{W}{L}$.
- $K_n'=K_p'=10^{-4} \text{ A/V}^2$.
- $\lambda_n=\lambda_p=0.01$.
- $\gamma=0.2 \text{ V}^{1/2}$.
- $-2\Phi_f=0.6 \text{ V}$.
- $V_{to,n}=V_{to,p}=0.3 \text{ V}$.
- Assume all substrates tied to appropriate supply unless otherwise shown in the circuit.
1. What is $V_{\text{in}}$ to set $V_{\text{out}}=0$?
2.

a) What is the maximum voltage at Vout if \(-1 V \leq Vin \leq 1 V\) and all transistors remain in saturation region?

b) Assume Vin is set so that Vout=0 V, what is the DC power dissipation of this circuit?
a) What is the maximum output voltage, $V_{out}$?

b) If $I_{out} = 10 \mu A$, what is $R_{out}$?
Assume the DC voltage at Vout is 0 V:

a) What is $Gm = \frac{i_{out}}{v_{in}} \bigg|_{Vout=0}$?

b) What is Rout?
5.

![Circuit Diagram]

- What is $v_{out}$ if $V_{IN} = 0.4$ V?

- What is the minimum value of $V_{IN}$ that has all the transistors in saturation?
a) What is the DC voltage at output node, \( v_{\text{out}} \)?

b) What is the gain \( \frac{v_{\text{out}}}{v_1 - v_2} \)?