

Figure 1: A Wilson Current Mirror.

1. This circuit is called a Wilson Current Mirror.
 - (a) Find V_{in} , $V_{out,min}$, R_{out} and ϵ for this current mirror. Assume all devices have the same I_S and β .
 - (b) Draw a PNP version of this current mirror.

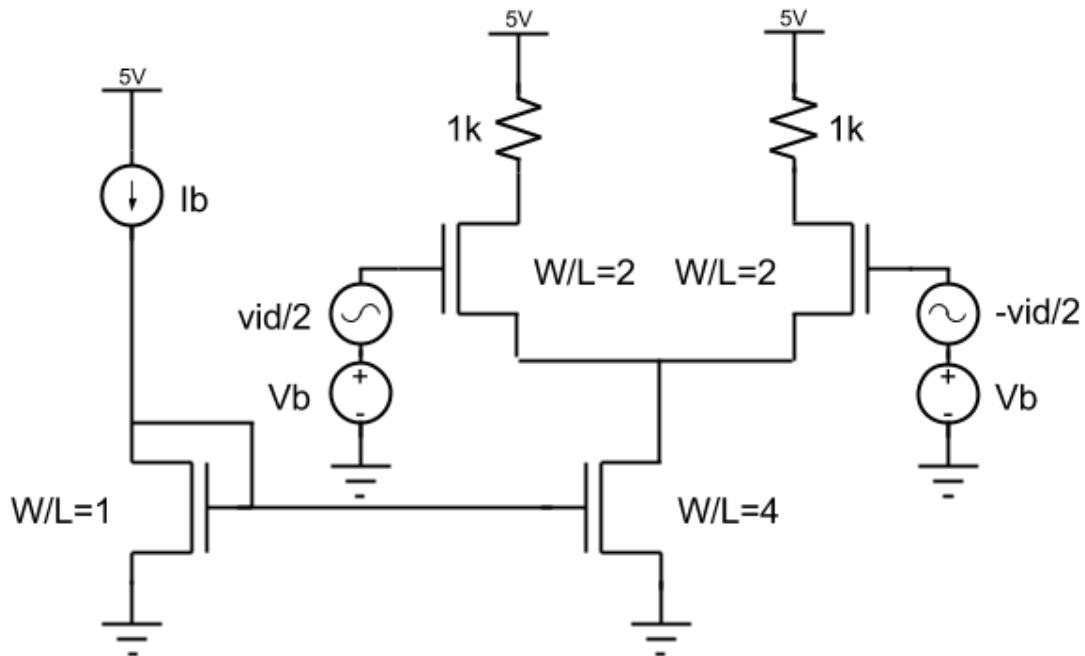


Figure 2: A differential amplifier biased with a current mirror.

2. Select an I_b and V_b for the amplifier shown in Figure 2 to achieve a differential mode gain of 20 and a DC output voltage of 4V. Assume $\mu_n C_{ox} = 200 \mu A/V^2$, $V_t = 1V$, $\lambda = 0 V^{-1}$, and the tail node sits at 1V.

Note that MOSFET mirrors have no ϵ because there is no gate current, but also note that the output current is affected by the W/L ratio of the output MOSFET.