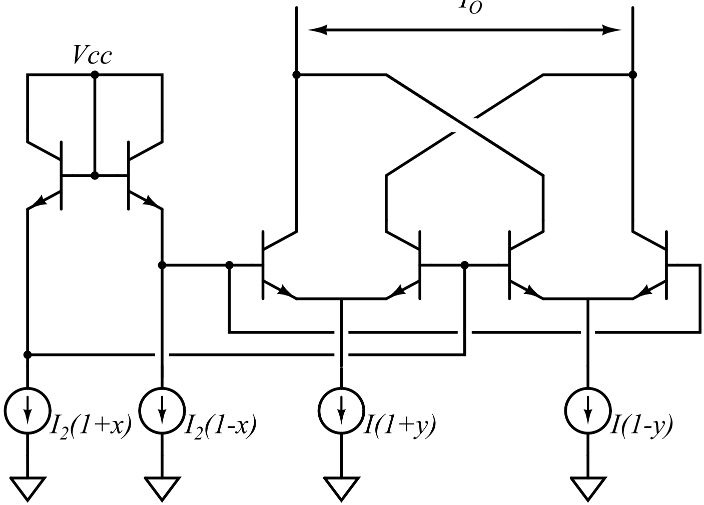
(f)



Name the transistors Q1 throught Q6 from left to right. Write the output currents as $I(1-z)$ and $I_o(1+z)$. Using the Gilbert loop formed by Q1, Q2, Q3, and Q4:

$$\begin{aligned}
I_2(1+x)I_y &= I_2(1-x)I_3 \\
I_2(1+x)(I(1+y)-I_3) &= I_2(1-x)I_3 \\
I(1+y)+xI(1+y)-I_3-xI_3 &= I_3-xI_3 \\
I(1+y+x+xy) &= 2I_3 \\
I_3 &= \frac{1}{2}I(1+y)(1+x)
\end{aligned}$$

Using the Gilbert loop from Q1, Q2, Q5, and Q6, we can similarly argue that

$$I_5 = \frac{1}{2}I(1-x)(1-y)$$

At the output,

$$\begin{aligned}
I_o(1+z) &= I_3+I_5 \\
&= \frac{1}{2}I(1+x+y+xy)+\frac{1}{2}I(1-y-x+xy) \\
I(1+z) &= I(1+xy) \\
z &= xy
\end{aligned}$$