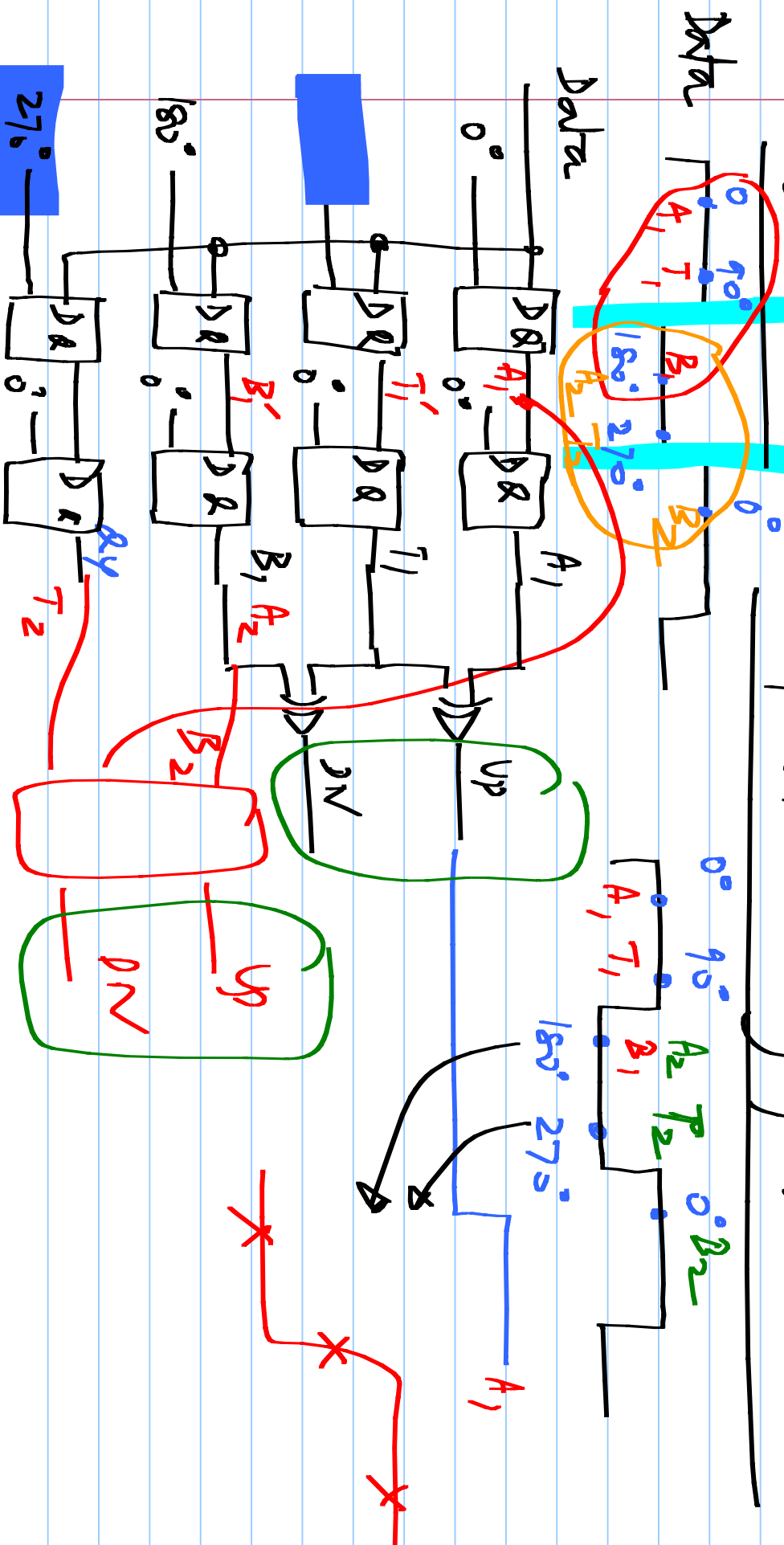
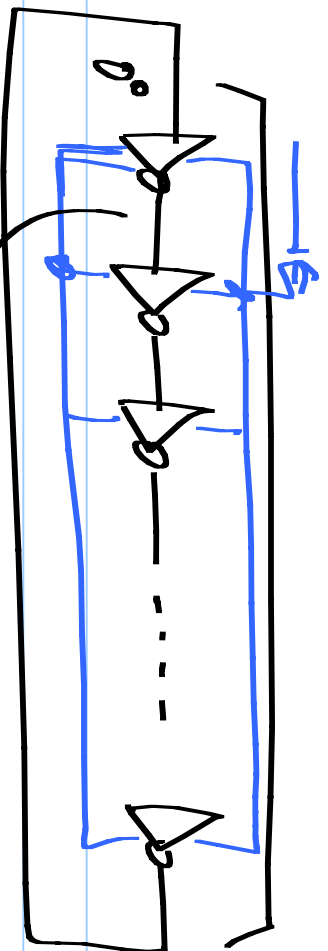


Half-rate binary phase detector

$$U^p = A \oplus T, \quad N^p = B \oplus T$$



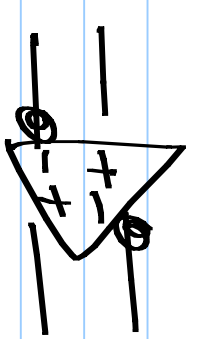
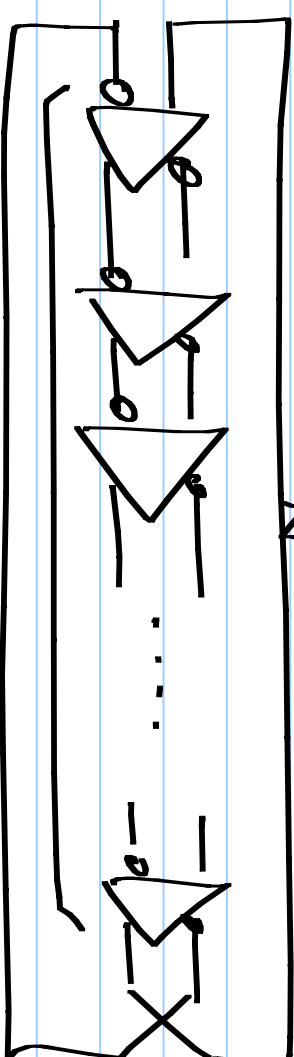


odd # of single ended inverters

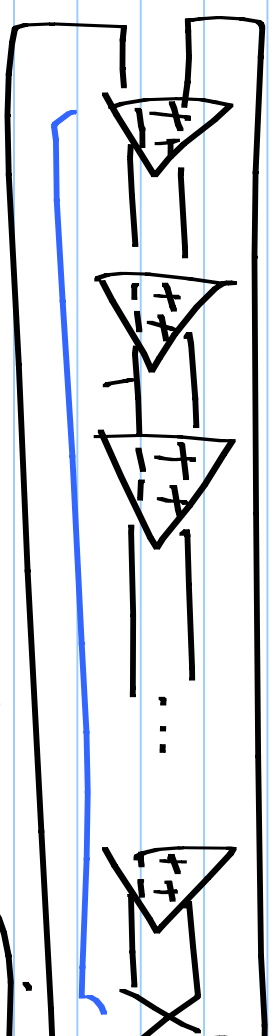
$$|g_v^o + \frac{|g_v^o}{N}$$

$N \geq 3$ | dc negative

f_b

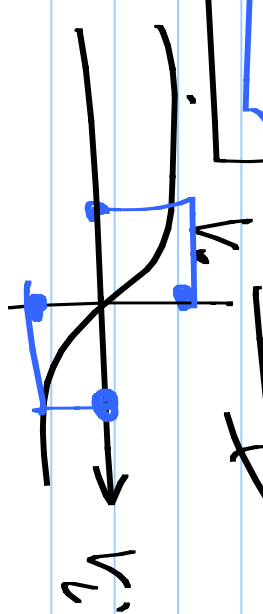


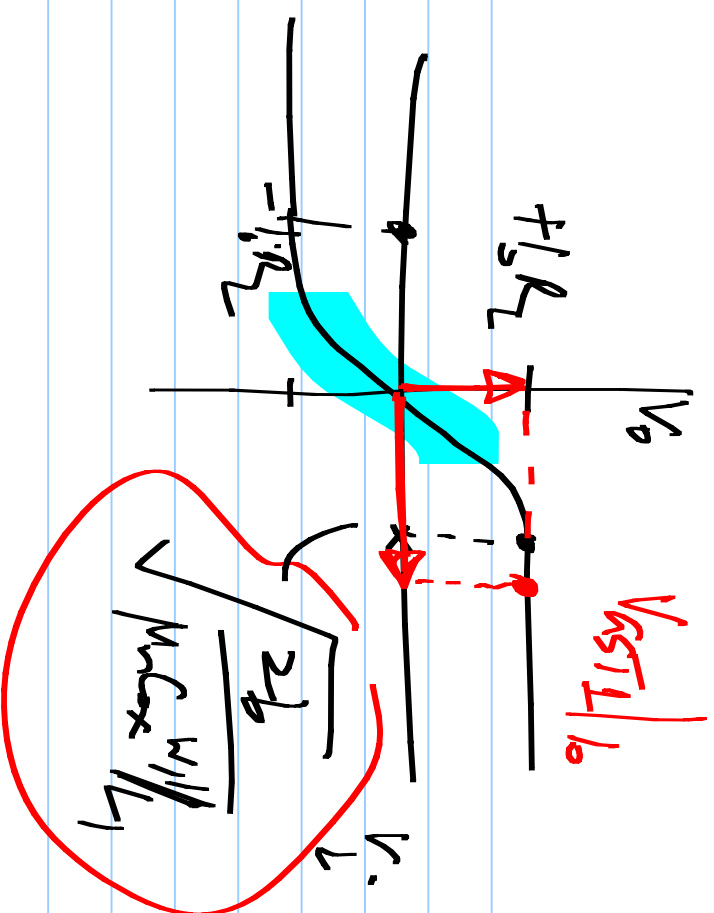
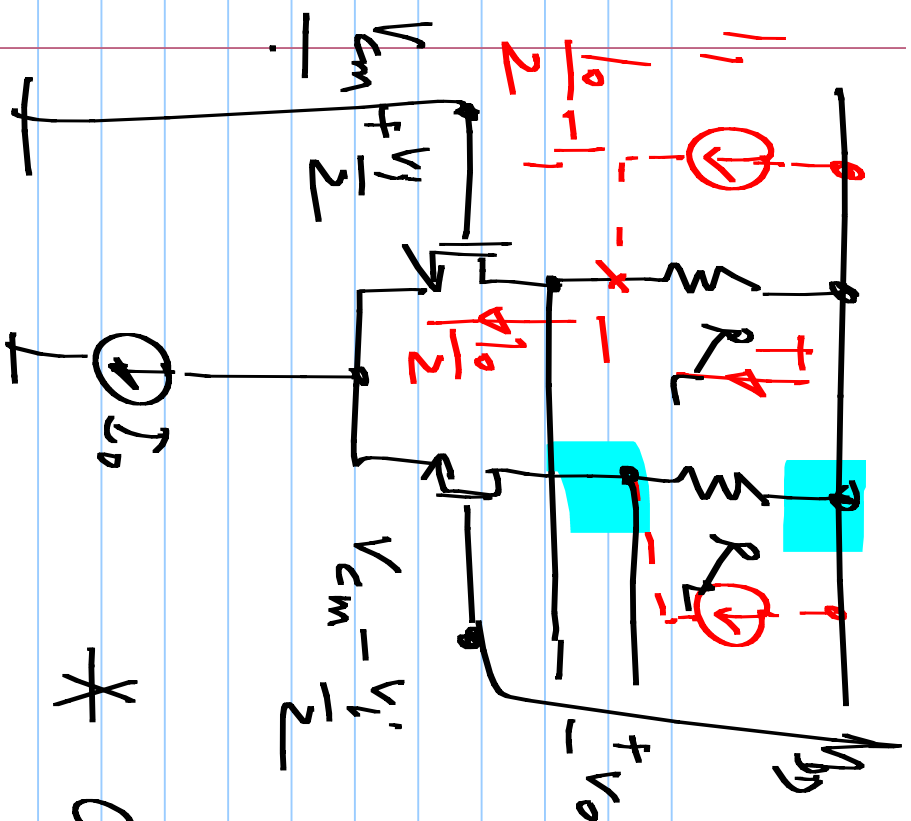
2N



$\frac{1}{2N}$

N





- * Current source in parallel with R_L to increase gain
- * PMOS in triode in place of R_L

