$A = A \times 1$

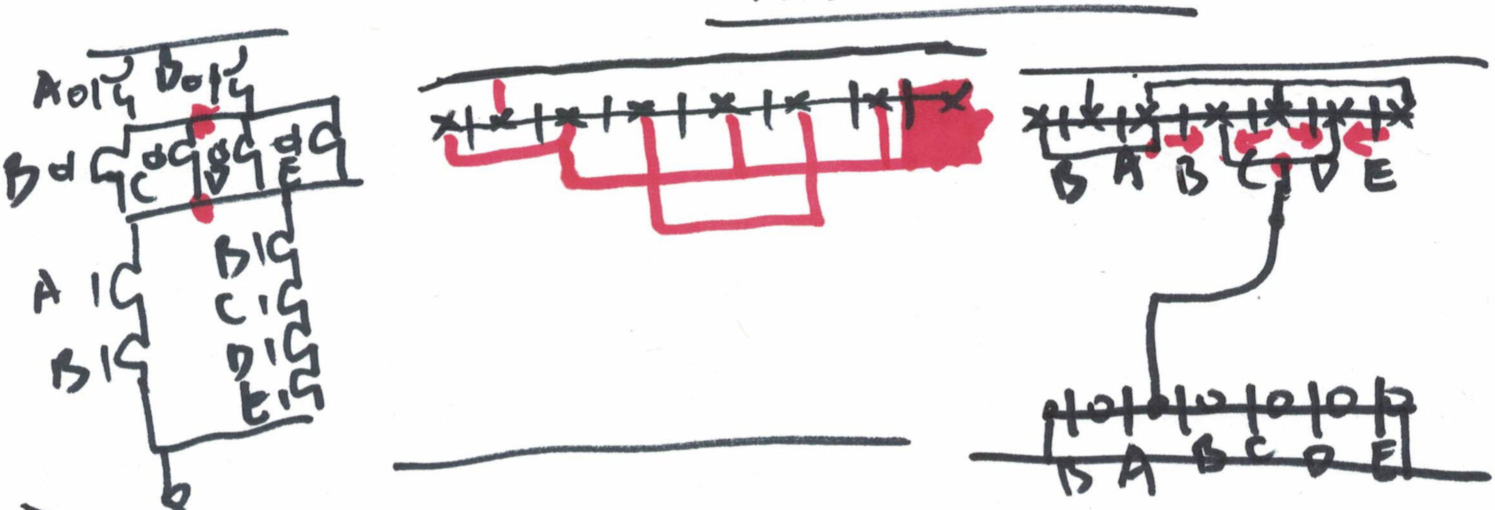
ENGR338 Quiz4

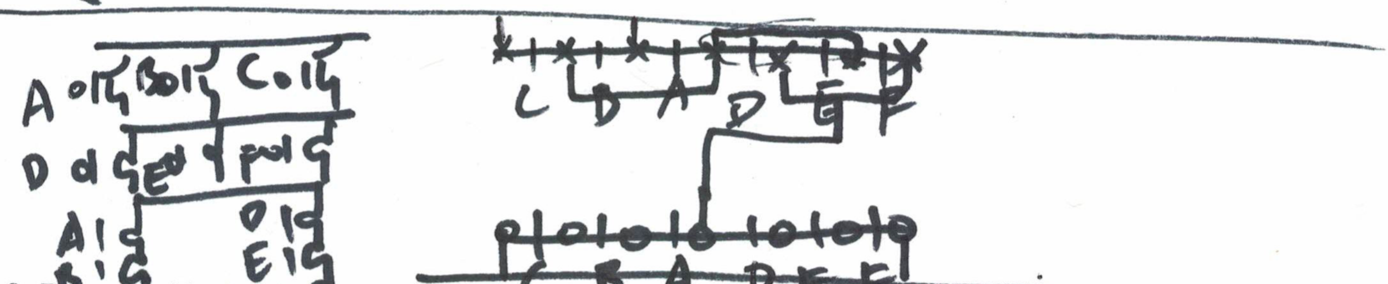
1. Draw the complex CMOS schematics and the stick diagrams of the following logic expressions. (25 points for each)

a. $\overline{(AB + A + ABD + CDE + ABCD)B}$ $= \overline{(A(1+B+BD+BCD) + CDE)\cdot B}$

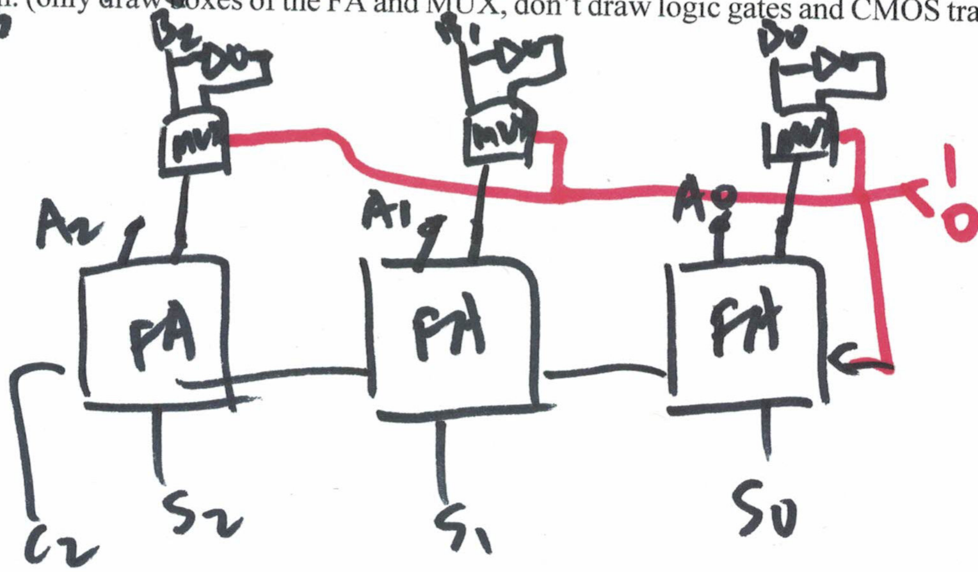
$= \overline{AB + BCDE}$

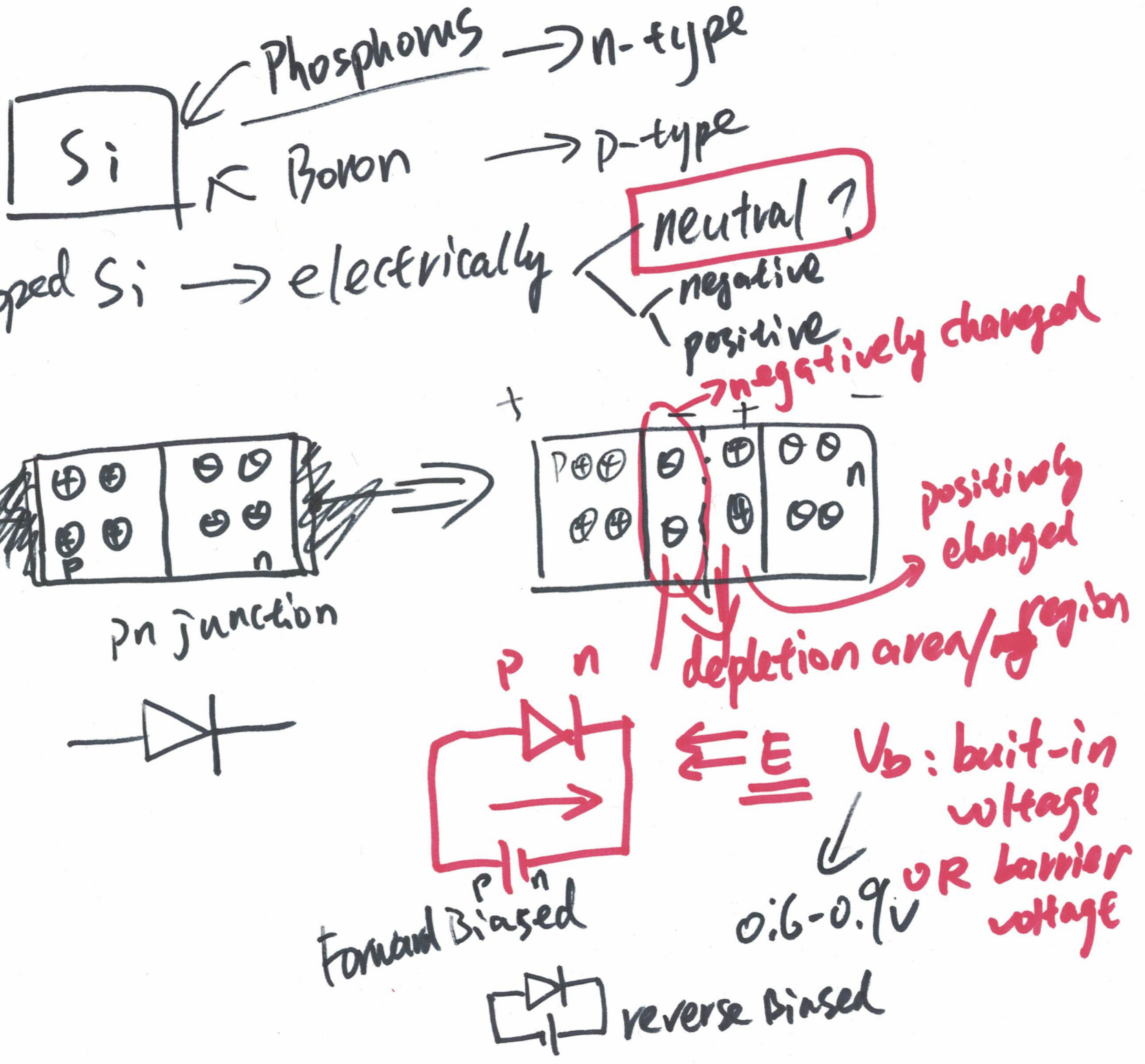
b. $\overline{ABC + DEF}$

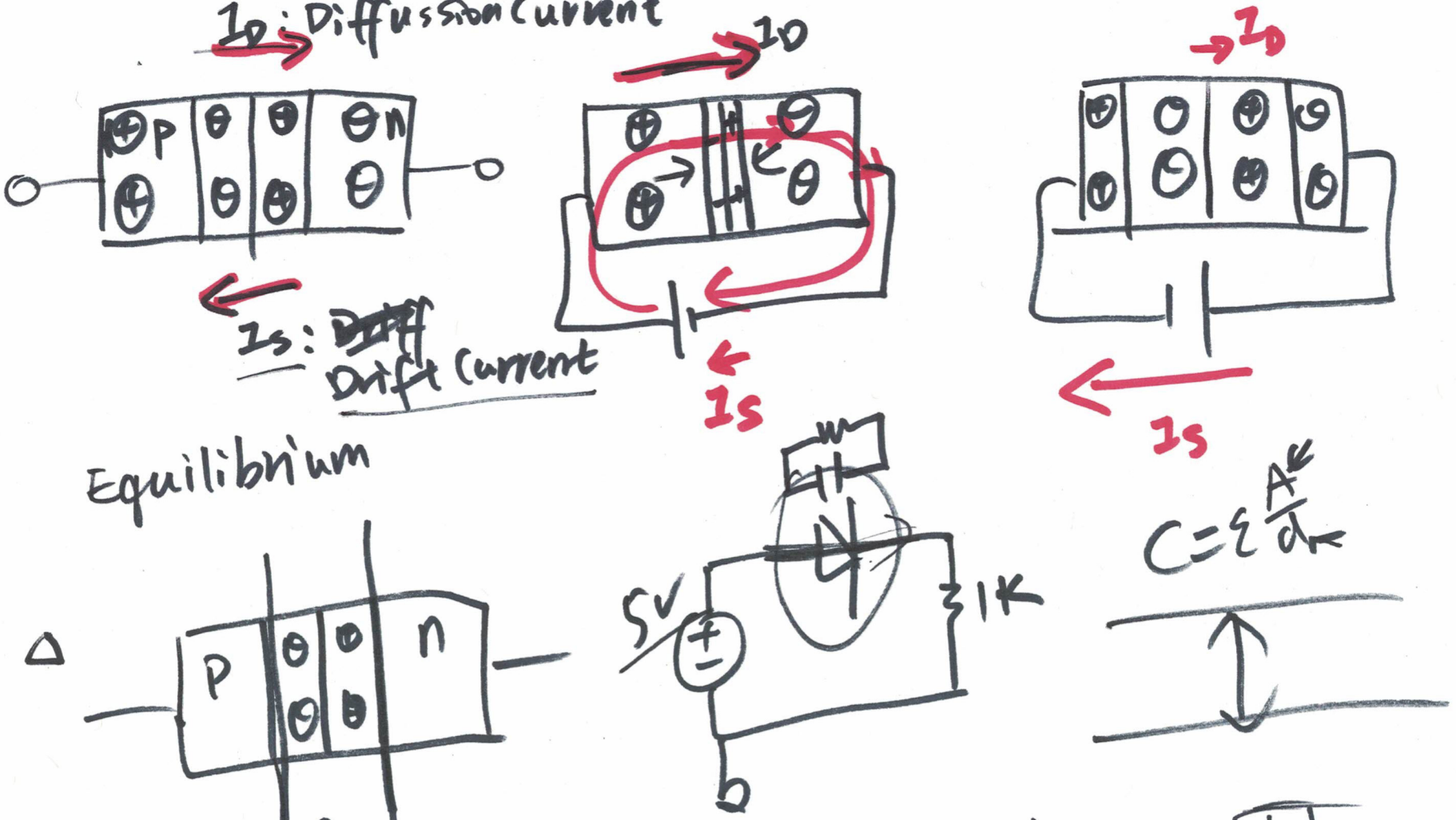




2. Draw the block schematic of a 3-bit adder/subtractor. Use MUXes and control bits to control the operation. (only draw boxes of the FA and MUX, don't draw logic gates and CMOS transistors). (50 points)




Phosphorus → n-type
Si
Boron → p-type
① Doped Si → electrically
neutral ?
negative
positive
negatively charged
positively charged
depletion area/region
pn junction
P n
E
Vb : built-in voltage OR barrier voltage
0.6-0.9V
Forward Biased
reverse Biased

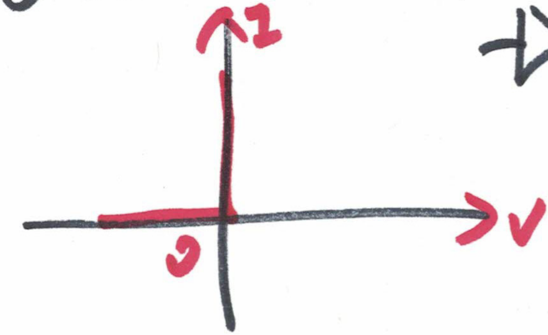


Equilibrium

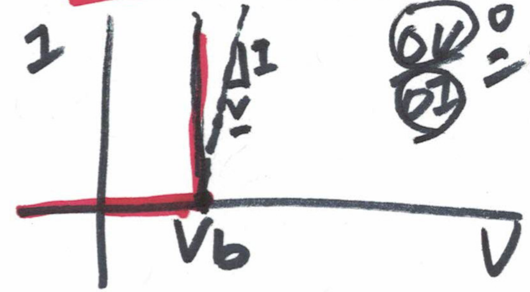
Forward Biased: C_J, larger

Reverse Biased: C_J ↓ smaller

① Ideal Diode:

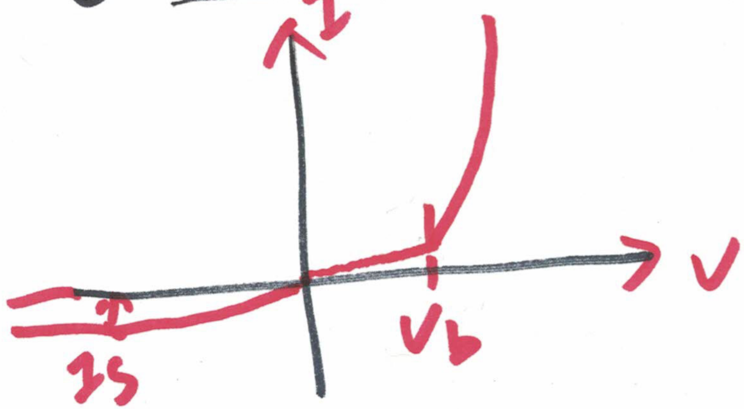


② Ideal Diode with V_b



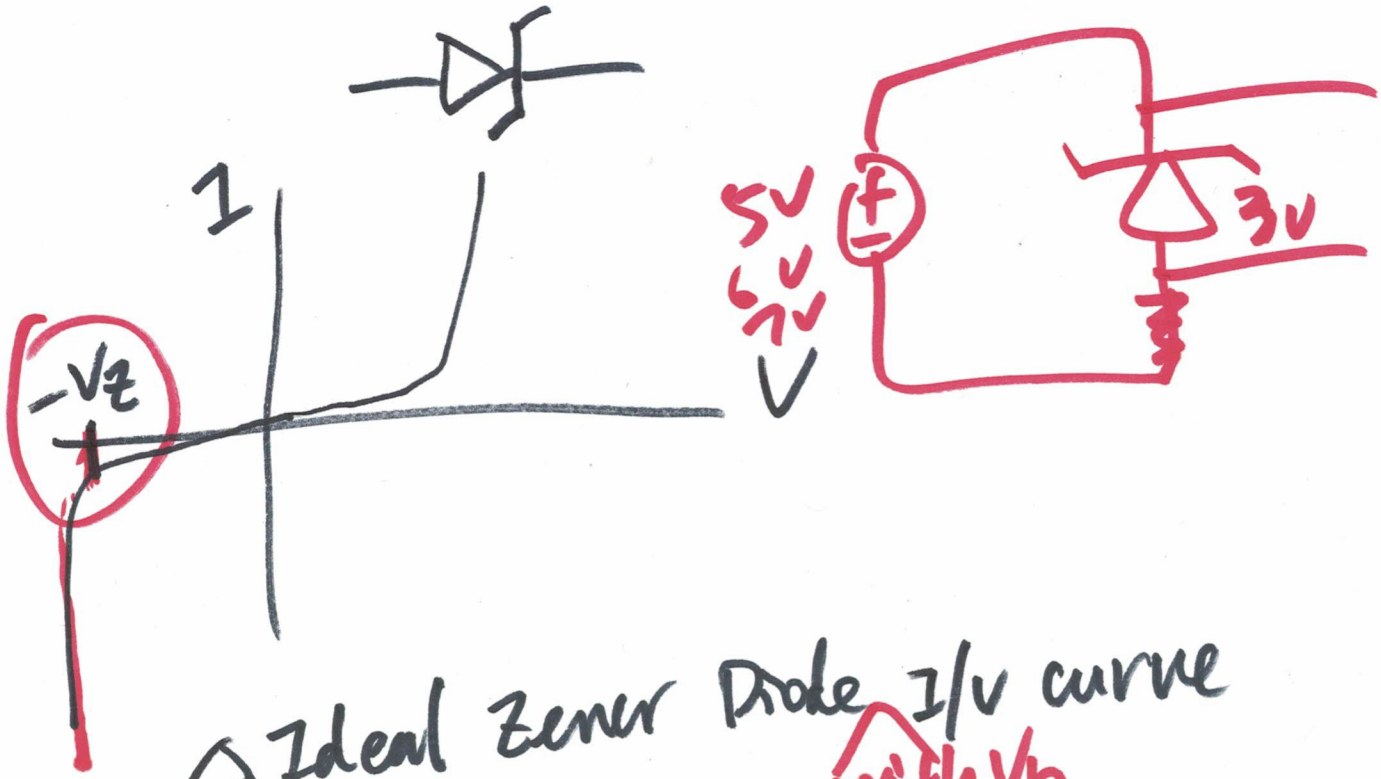
$\frac{\Delta V}{\Delta I} = R$

③ real diode, no reverse breakdown

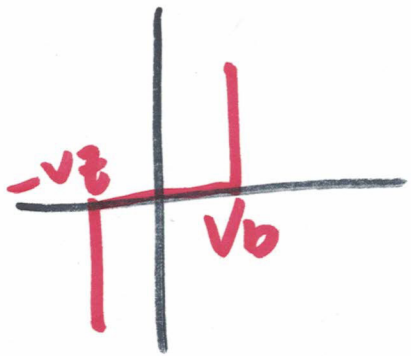


④

△ Zener Diodes → used for stabalizing voltages



△ Ideal Zener Diode I/v curve with Vo



AOI/Stick

DAC (superposition/Thevenin), state Diagrams

INL/DNLs

Adder/Subractor