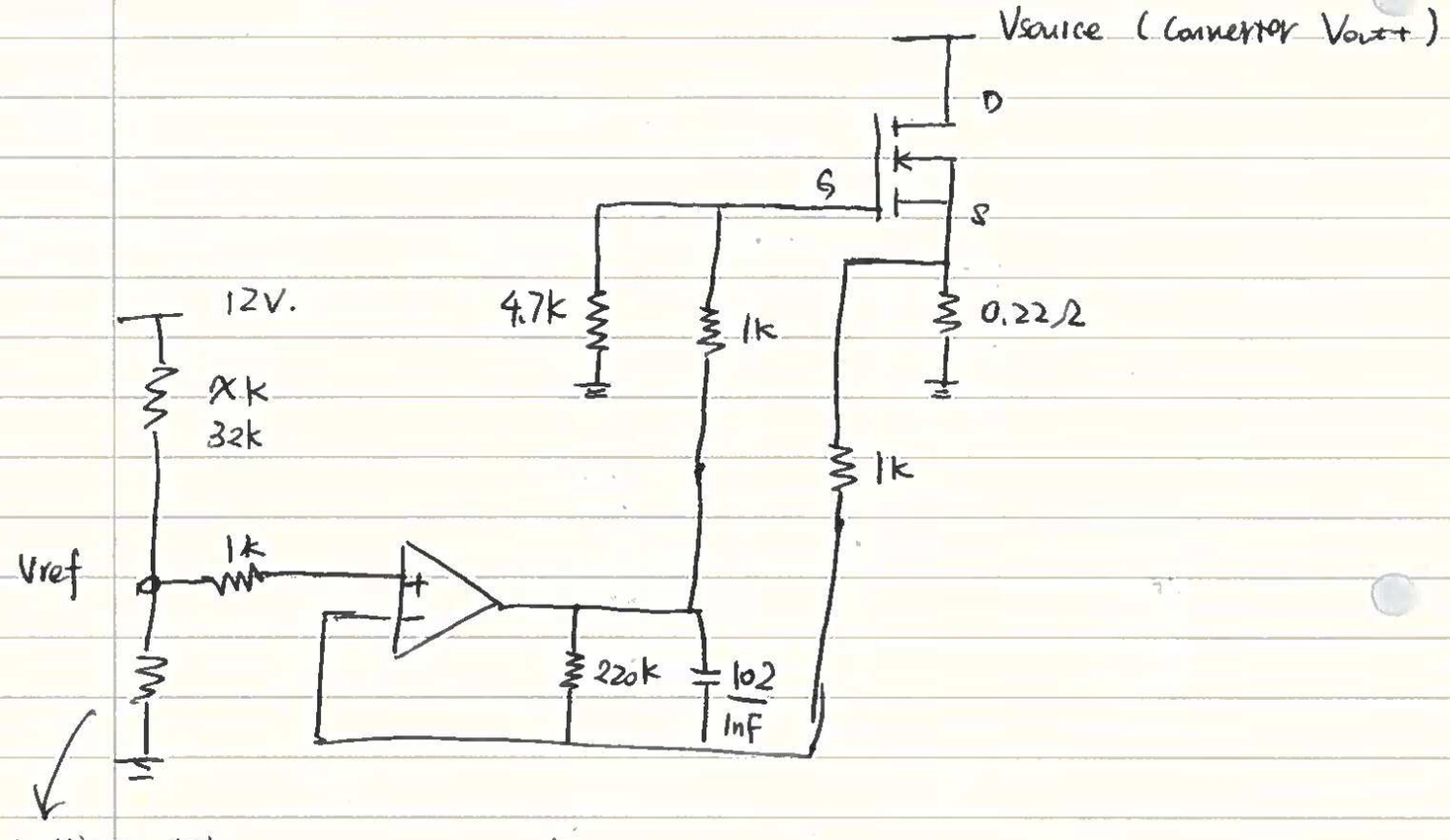
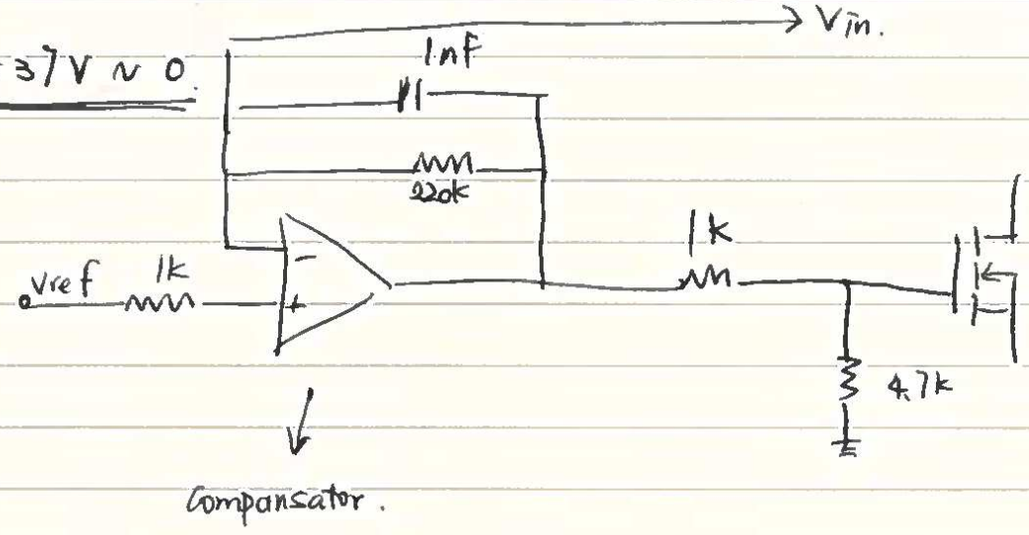
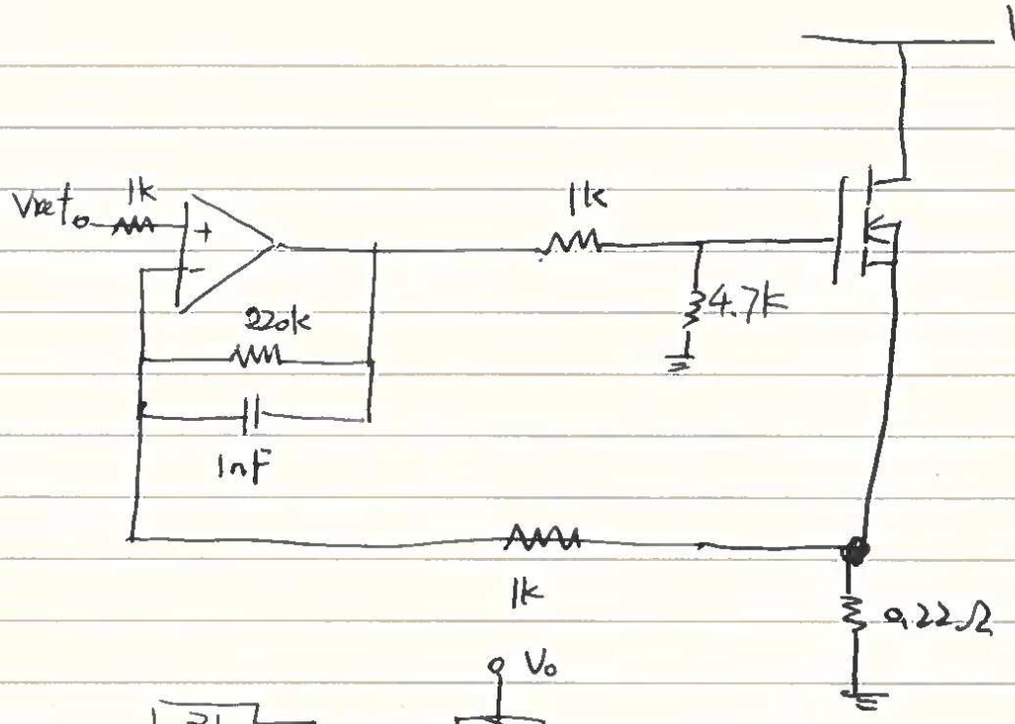
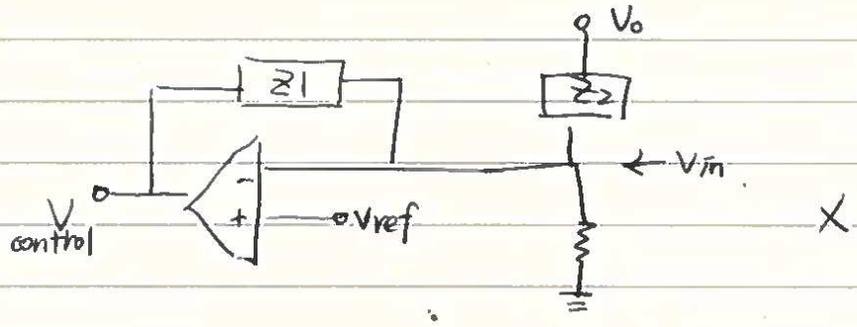


$$V_{ref} = 12 \times \frac{4.7k}{4.7k+32k} \approx 12 \times \frac{?}{4.7k+32k}$$

$= 1.537V \approx 0$



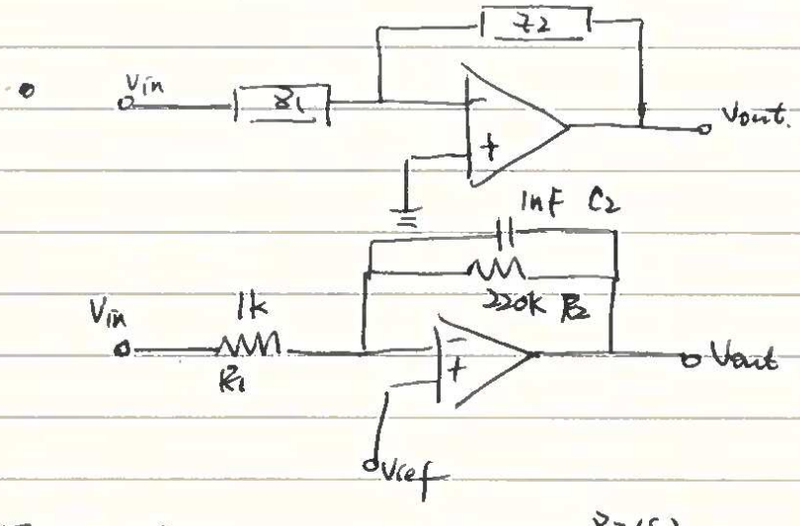




X

Transfer function for op-amp design.

constant current



f in μ n.

$1 \times 10^{-f} \times 220 \times 10^{3}$

$= 220 \times 10^{-6}$

$= 0.22 \times 10^{-3}$

Transfer function: $G_S(s) = -\frac{Z_2(s)}{Z_1(s)} = -\frac{\frac{1}{\frac{1}{R_2} + sC_2}}{R_1}$

$= -\frac{1}{R_1} \times \frac{1}{\frac{1}{R_2} + sC_2}$

$= -\frac{R_2}{R_1} \times \frac{1}{1 + sC_2R_2} = -\frac{R_2/R_1}{1 + sC_2R_2} = \frac{\frac{220k}{1k} = 220.}{1 + s.1n \times 220k}$

$\frac{R_2}{R_1} \times$ → Matlab. sys = tf([a. b. c], [A, B C D]

$\frac{as^2 + bs + C}{}$

Common Current Mode

→ Common Resistance Mode

$\frac{V_{source}}{2k} = \frac{V_s}{2}$ = current (varying depends on Vsource)

2k: Set resistance

Voltage across Rsense $= 0.22 \times \frac{V_s}{2} = \frac{0.22}{2} \times V_s = 0.11 \cdot V_s$

$\frac{V_s}{2}$: current I_d ; $0.11 \cdot V_s$: Voltage across Rsense.

if set $R = 20\Omega$

$V_{source} = 1 \sim 5V$

$current = \frac{[1 \sim 5]}{20} = [0.05 \sim 0.25]\ A$

$V_{sense} = 0.22 \times [0.05 \sim 0.25]$

$= [11 \sim 55]\ mV$

$ratio = \frac{[0.011 \sim 0.055]}{[1 \sim 5]}$ → 0.00275

$ratio = \frac{11}{1000} \sim \frac{55}{5000}$ → 1wk

$= \frac{11}{1000} \sim \frac{11}{1000}$

1ok Vs

$\frac{B}{A+B} = \frac{11}{1000}$

$A - B =$ [redacted]

$989 = 11$

For 4 stages → 0.1A → 0.025 A per branch

$5V / 0.025 = 50\Omega$

$\frac{0.22}{50} \times V_s =$ $\frac{0.021}{4.4}$

2.75×10^{-3} ratio $= \frac{0.00275}{1}$ 1wk

$\frac{0.1}{4} = 0.025A$

10V → 0.22 → 1A

0.022 → 0.1A

0.0055 → 0.025A

0.025