교수님 목소리 작으시다.

$$A_{dif} = \frac{-(R_3 + R_4)}{r_{\pi 1}/\beta + r_{\pi 2}/\beta + R_1 + R_2}.$$

* Common Mode gain
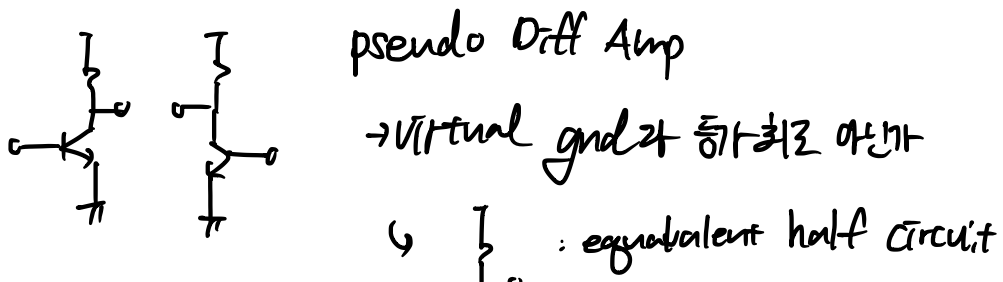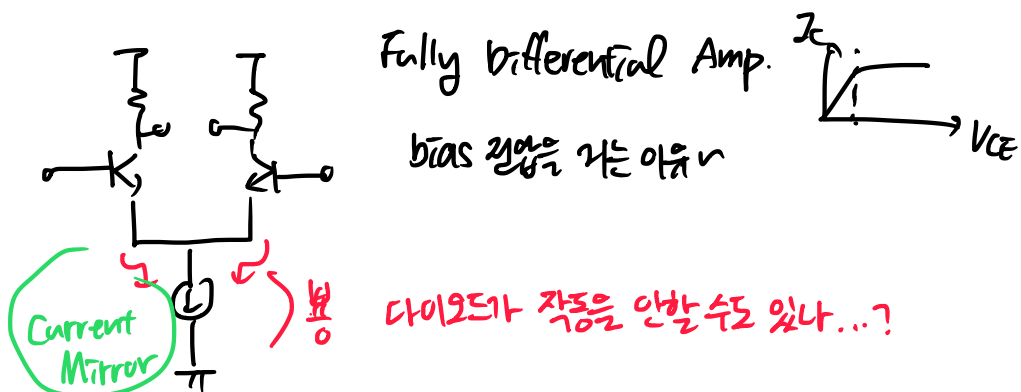

↳ common mode
noise

노이즈가 발생하는 이유
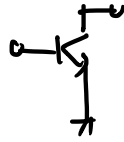   전원노이즈, 아날로그 — 디지털 노이즈

Common mode는 절대값이 중요하지 X → 얼마나 작냐
CMRR — Common Mode Rejection Ratio

$$\mathrm{cm}\,RR = \frac{ADM}{A\mathrm{cm}}$$

Fully Differential Amp.
bias 전압을 거는 이유 ∨

다이오드가 작동을 안할 수도 있나...?

Current Mirror

봉

pseudo Diff Amp
→ Virtual gnd과 흡사하지 않은가
    ↳ : equivalent half circuit
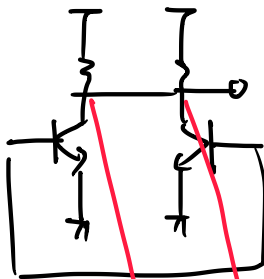
$$A_{CM} = \frac{R + R}{\frac{1}{g_m} + \frac{1}{g_m}}$$

A_{CM} : 입력, 출력이 같음
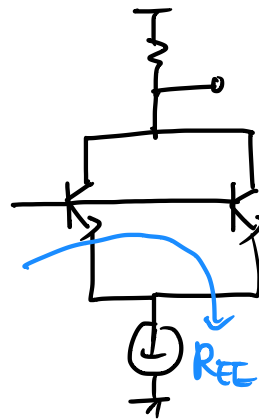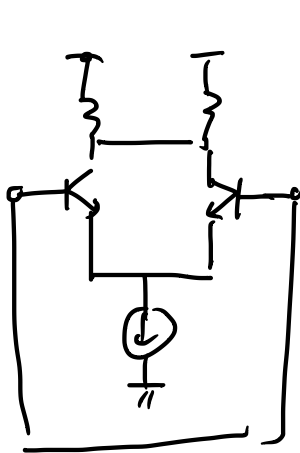
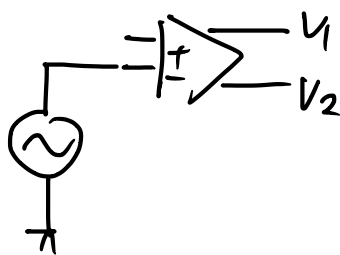$$A_{CM} = \frac{R/2}{\frac{1}{g_m} // \frac{1}{g_m} + R_{EE}}$$

R_{EE}

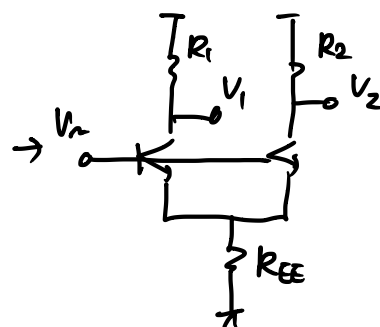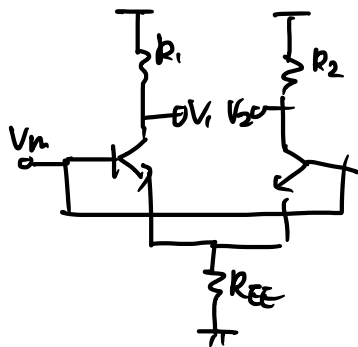$$A_{CM} = \frac{R/2}{\frac{1}{g_m} // \frac{1}{g_m}} = A_{DM}.$$

배면 얻히 사라짐

↳ 왜쓰?).

A_{CM-DM} : 수정된 버전의 CM gain

$$A_{CM-DM} = \frac{V_1}{V_m} - \frac{V_2}{V_m}$$
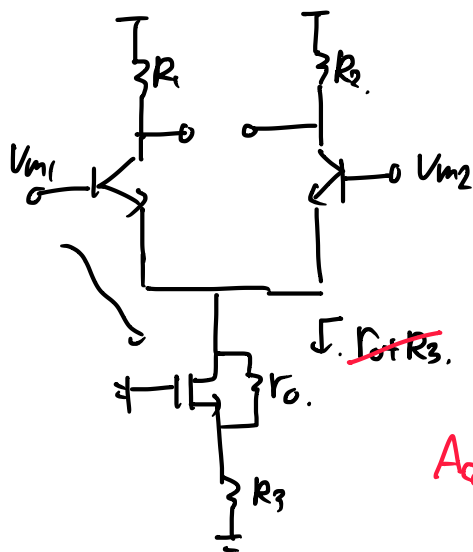
$$\Rightarrow CMRR = \frac{A_{DM}}{A_{CM-DM}}$$

A_{CM-DM}

$$= \frac{\frac{I_1}{I_1+I_2} \times R_1 - R_2 \times \frac{I_2}{I_1+I_2}}{\frac{1}{g_m} // \frac{1}{g_m} + R_{EE}}$$

* Current division

$$\frac{I_1}{I_1+I_2} = \frac{1/g_{m2}}{1/g_{m1} + 1/g_{m2}} \qquad \frac{I_2}{I_1+I_2} = \frac{1/g_{m1}}{1/g_{m1} + 1/g_{m2}} \rightarrow 기억해라$$

(0,2)

$$A_{DM} = \frac{R_1 + R_2}{1/g_{m1} + }$$

$$A_{CM-DM} = \frac{R_1 \times \dfrac{1/g_{m2}}{1/g_{m1} + 1/g_{m2}} - R_2 \times \dfrac{1/g_{m1}}{1/g_{m1} + 1/g_{m2}}}{1/g_{m1} \,//\, 1/g_{m2} + r_0 + R_3}$$

$$\downarrow \cdot r_0 + R_3.$$

$$R_x = R_3 + \frac{(1 + g_{m3}R_3)\, r_0}{\text{FB} \to \text{커져요}}$$

$$A_{CM-DM} = \frac{R_1}{1/g_{m1} \,//\, 1/g_{m2} + R_x} \quad \cdots$$

$$A_{DM} = \frac{R_1 + R_2}{1/g_{m1} + 1/g_{m2}}$$

FB는 이파가 알자..

나는 멍청이라 current divider를 까먹었어요

나는 멍청이라 current divider를 까먹었어요