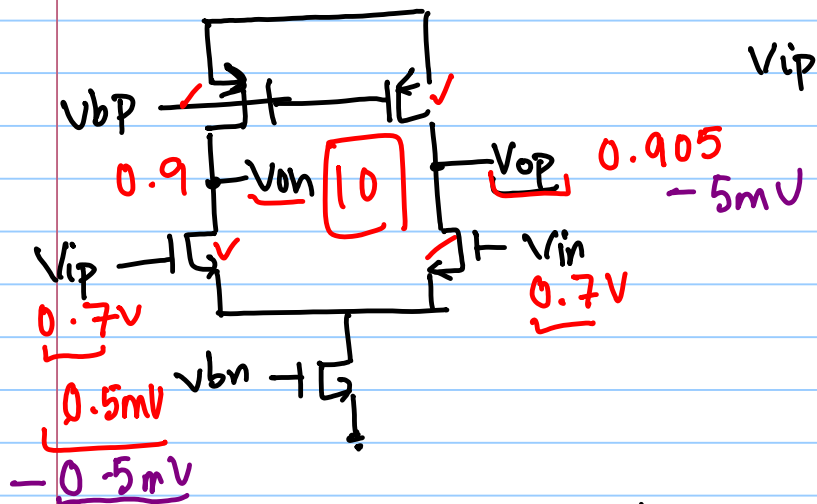
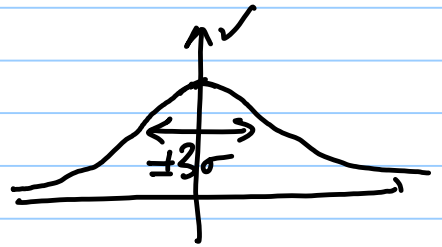
Lecture # 40

Note Title 09-04-2019

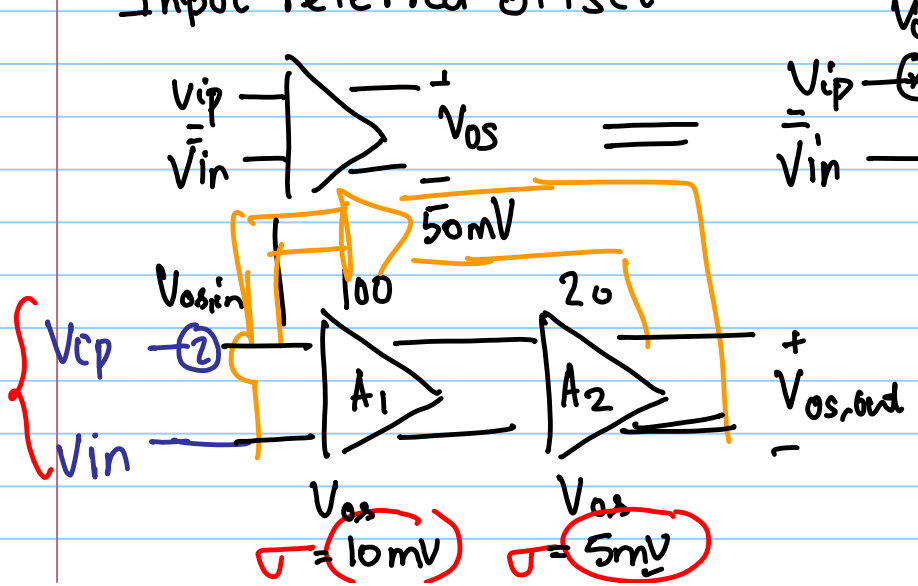


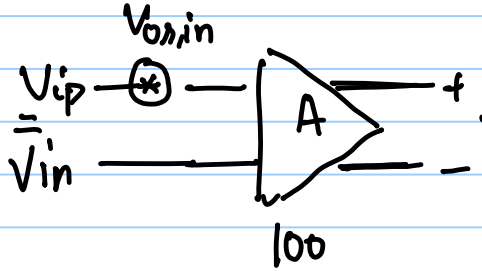
$V_{ip} = V_{in} \rightarrow V_{op} \neq V_{on}$

$\Delta V_{out} = (V_{op} - V_{on})\,\sigma_{os}$ (with $V_{ip} = V_{in}$)



Input referred offset —





$V_{out} = V_{os,out} = A V_{os,in}$

$V_{os,out} = A_1 . A_2 . V_{os,in}$

$V_{os,out} = 5\text{ mV} + A_2 . 10\text{ mV}$

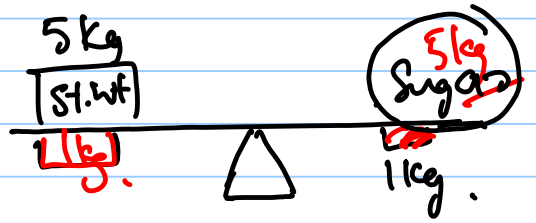
$\sigma^2_{os,out} = \sigma^2_{os,Amp2} + A_2^2 . \sigma^2_{os,Amp1}$ ✓

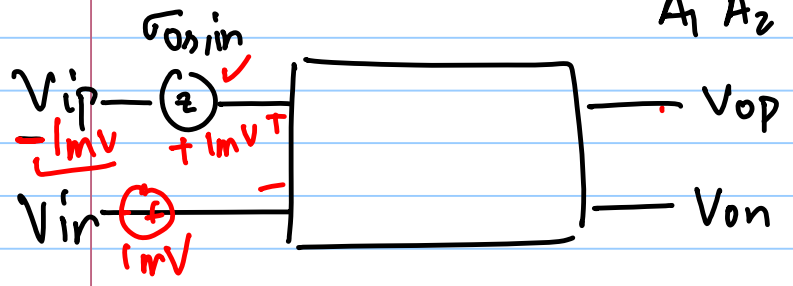
$$V_{os,out} = V_{os,amp2} + A_2 \cdot V_{os,amp1}$$

$$V_{os,out} = A_1 \cdot A_2 \cdot V_{os,in}$$

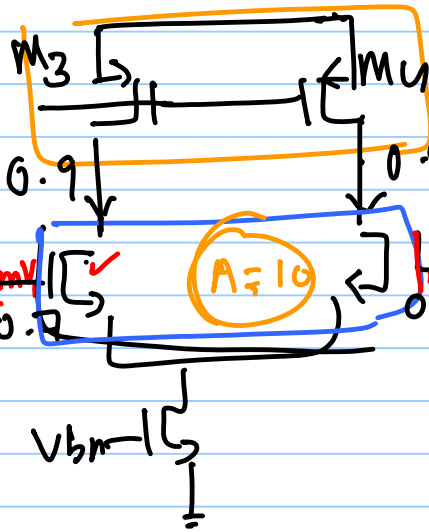
$$\sigma^2_{os,out} = A_1^2 A_2^2 \, \sigma^2_{os,in}$$

$$\sigma^2_{os,in} = \frac{\sigma^2_{os,amp2}}{A_1^2 A_2^2} + \frac{1}{A_1^2}\sigma^2_{os,amp1}$$

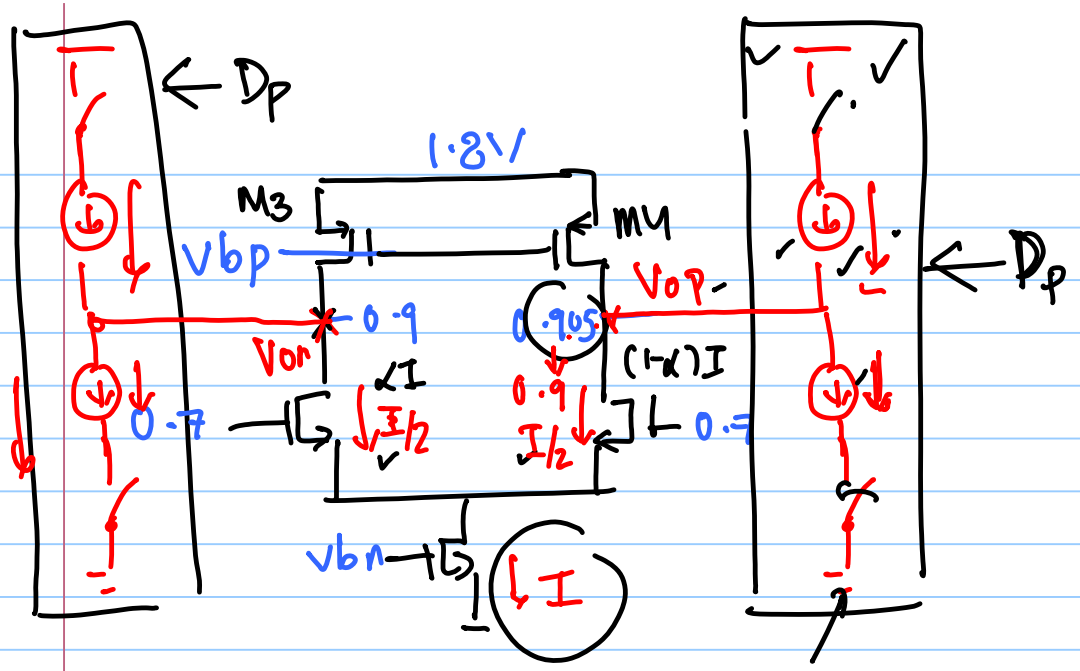




$|V_{os,in}| < 3\sigma$



$V_{ip} = \frac{V_{diff}}{2} - 0.5mV$ $\quad V_{in} = -\frac{V_{diff}}{2}$



$V_{op} = V_{on}$

$V_{op} - V_{on} \neq 0$

$\sigma_{os,out} = 10\,mV$

$\left| V_{op} - V_{on} \right|_{V_{ip} = V_{in}} \leq 3\sigma = \pm 30\,mV$

$-30mV < V_{os,out} < 30\,mV \longrightarrow$

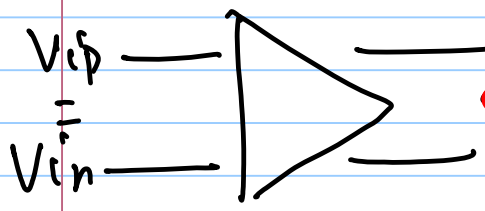
Range = 64 mV

Resolution of offset cancellation

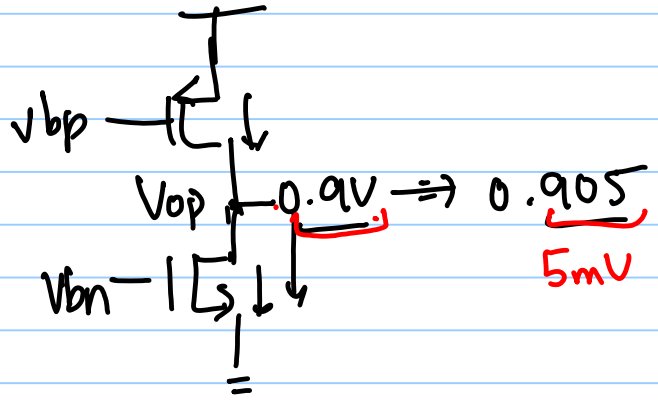
= 2mV ← Residual offset.

0, 2mV, 4mV

5.1mV → 1.1mV, −0.9mV

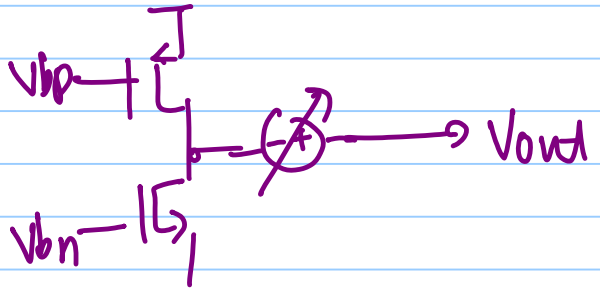


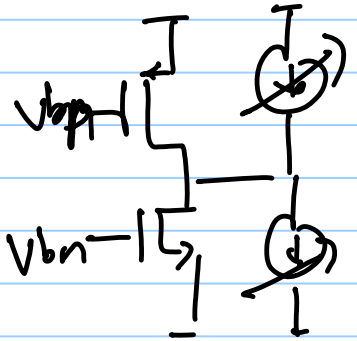
$R_{out} \times I_{DAC,LSB} = V_{reso}$.



$\Rightarrow 0.905$

5mV

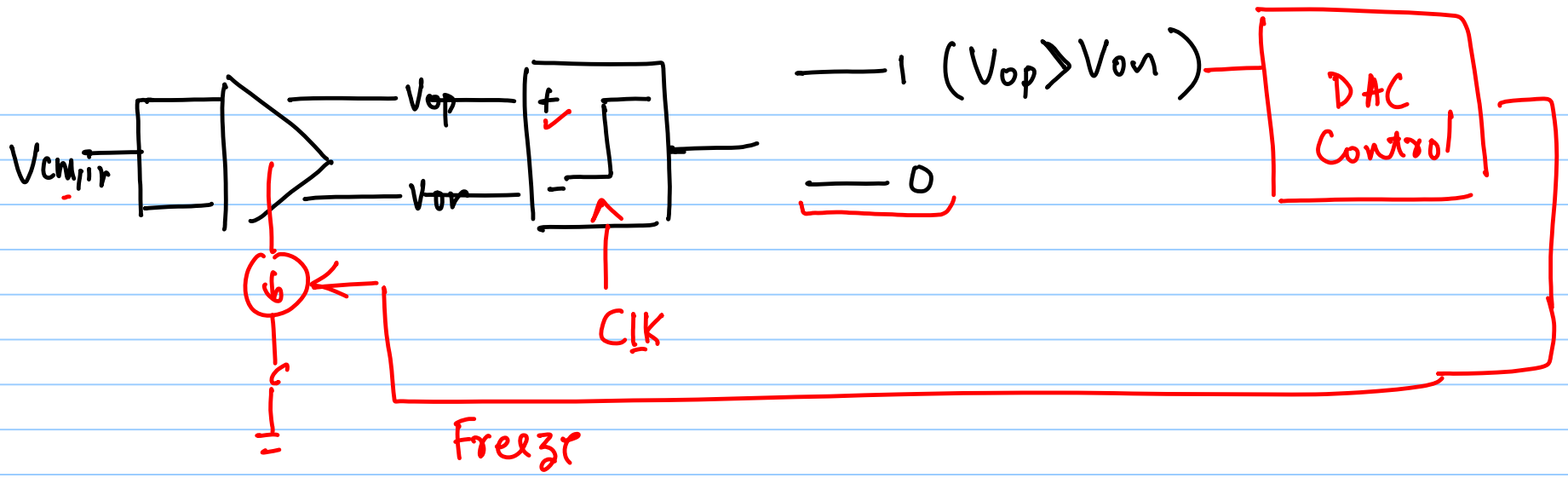




$$I_p = \frac{K_r}{2}\left(\frac{W}{L}\right)_p \left(V_{DD} - V_{bp} - |V_{TP}|\right)^2 \left(1 + \lambda\left(V_{DD} - V_{out}\right)\right)$$

$$I_N = \frac{K_r}{2}\left(\frac{W}{L}\right)_n \left(V_{bn} - V_{tn}\right)^2 \left(1 + \lambda\left(V_{out}\right)\right) + \Delta I = I_p$$

$\Delta V = \Delta I \cdot R_{out}$


Vcm,ir
Vop
Von
+
-
1 (Vop > Von)
0
DAC Control
CLK
Freeze
+5mV
-5mV