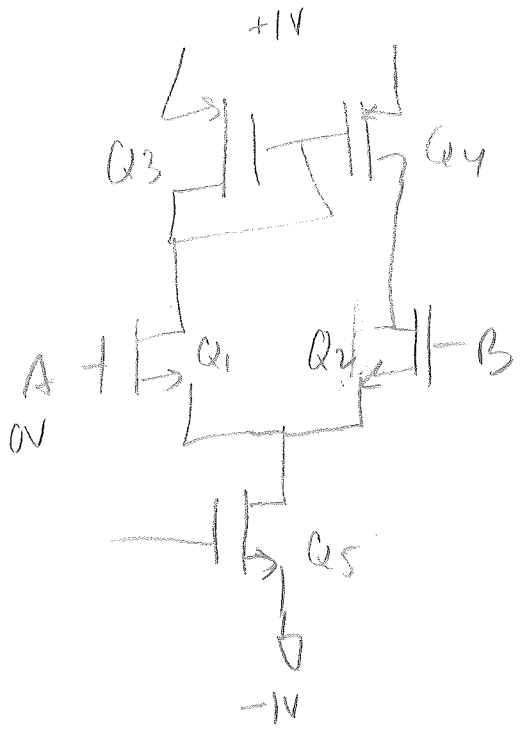
11/28/2016



→ V_{OS} for all = 0.628V

→ V_T = 0.4V → $V_{OS} - V_T$ = 0.228V

(a) $V_{OSS} = V_{OS} - V_{SS}$

$V_{OS} = 0V - 0.628V = -0.628V$

$V_{SS} = -1V$

$V_{OSS} = -0.628 - (-1) = 0.372V$

$> 0.228V$

$\uparrow$

V_{ov}

(b) $V_{CM\,min}$ → Q5 in sat

$V_{OSS} = V_{ov} = 0.228V$ minimum

$V_{OSS} = V_{DS} - V_{SS}$

$V_{DS} = V_{CM} - V_{GS1}$

$V_{SS} = -1V = V_{SS}$

$0.228V = V_{CM} - (0.628) - (-1) \rightarrow V_{CM} = 0.228 + 0.628 + (-1)$

$V_{CM} = -0.144V$

(c) $V_{CM\,max}$ → Q_1 in sat

$V_{DS1} = V_{ov} = 0.228V$ - minimum

$V_{D1} = V_{DD} - |V_{SG3}|$

$V_{S1} = V_{CM} - V_{GS1}$

$V_{DS1} = (V_{DD} - V_{GS3}) - (V_{CM} - V_{GS1})$

$0.228V = (1V - \cancel{0.628}) - (V_{CM} - \cancel{0.628})$

$V_{CM} = 1V - 0.228V = 0.772V$

$V_{CM\,max}$