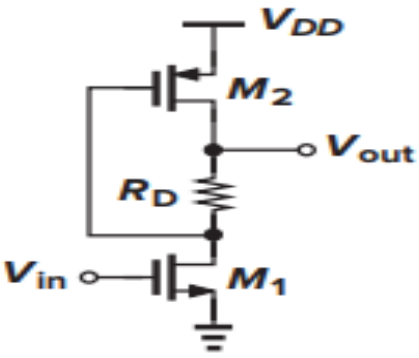
ACMOS ECE315 / ECE515

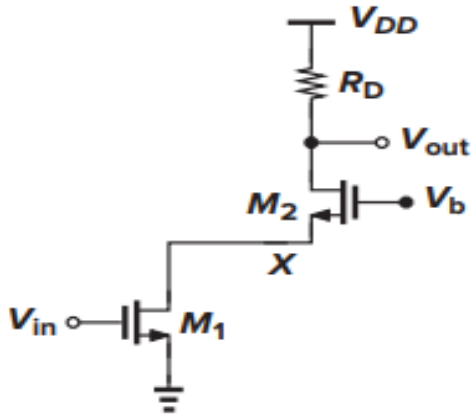
PRACTICE SHEET-2

Q1) Assuming all MOSFETs are in saturation, calculate the small-signal voltage gain of circuit in Fig. 1. (λ= 0, γ = 0) **(fig 1.)**



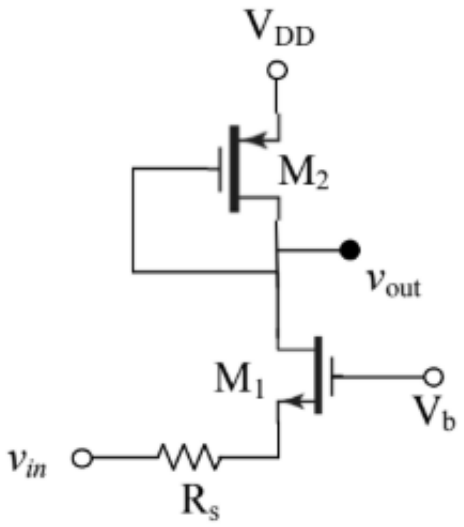
(fig 1.)

Q2) In the cascode stage of Fig. 2, assume that (W/L)1 = 50/0.5, (W/L)2 = 10/0.5, ID1 = ID2 = 0.5 mA, and RD = 1 k. Vth=0.77v Ignore Body effect. **(fig 2.)**
(a) Choose Vb such that M1 is 50 mV away from the triode region.
(b) Calculate the small-signal voltage gain.



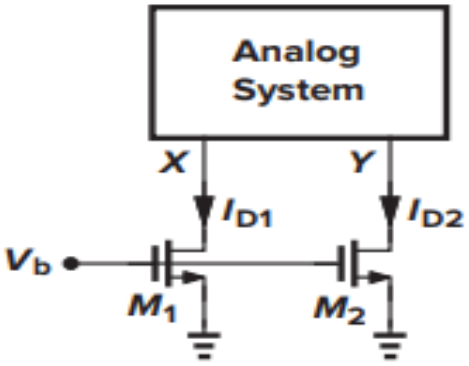
(fig 2.)

Q3) Assuming all the MOSFETs in Fig. 3 are in saturation and λ = 0, γ = 0,
(a) draw a simplified small-signal equivalent model of the circuit in Fig 3.
(b) calculate the small-signal voltage gain of the circuit. **(fig 3.)**



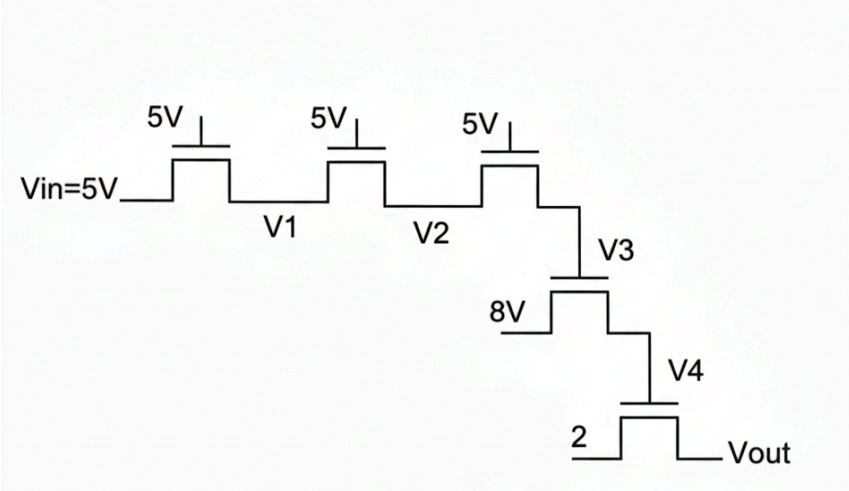
(fig 3.)

Q4) Two identical NMOS transistors are used as constant current sources in a system Fig. 4. However, due to the internal circuitry of the system, VX is higher than VY by V.
(a) Calculate the resulting difference between ID1 and ID2 if λ= 0. **(fig 4.)**



(fig 4.)

Q5)What will be the voltage at node Vout for the following circuit?(Vth for all NMOS is 1V). **(fig 5.)**



(fig 5.)