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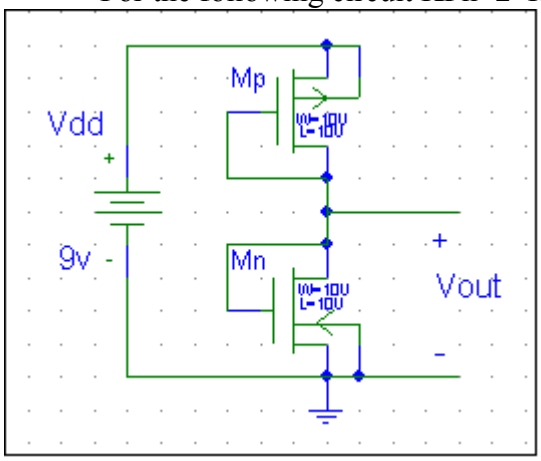
ENEE 302 Midterm Exam, Tu 10/24/00

Open Book, Open Notes, 100 points, 60 minutes

Work all problems; if stuck or spending more than the indicated time, go on to the next problem. Be sure to sign your exam. Good luck.

1.(45 points, 25 min)

For the following circuit KPn=2*KPp=2*10^{-4}a/v^2, VTOp=-2*VTOn=-1v



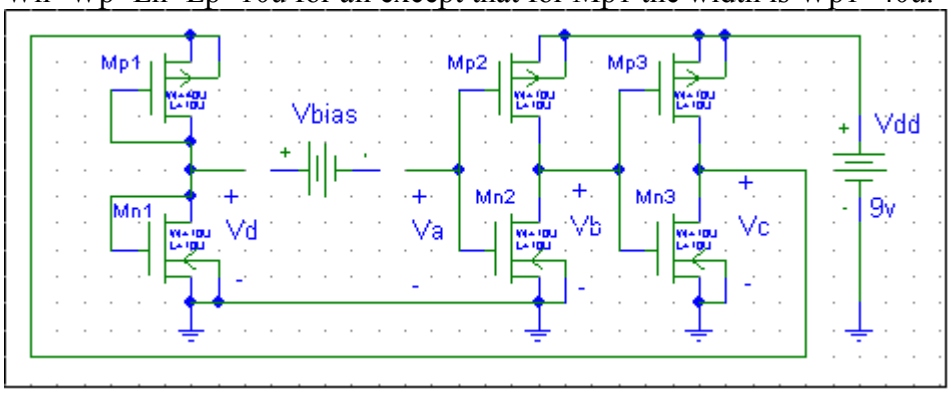
a). Find Vout.

b). If Vdd varies from 0v to 9v plot Vout versus Vdd.

c). Assume all parameters are as originally specified, Vdd=9v, except that Wn is variable; find Wn such that Vout is 5v.

2. (55 points, 30 minutes)

For the following assume that KPp=KPn=10^{-4}a/v^2, VTOp=-VTOn=-1v, Wn=Wp=Ln=Lp=10u for all except that for Mp1 the width is Wp1=40u.



a). Sketch the transfer characteristic of the transistors, Vd versus Va; label important points. In so doing include sketches of the intermediate voltages Vb, Vc.

b). When Vbias is connected (with short leads), sketch the resulting "load line" on the sketch of a) for various values of Vbias, distinguished by the number of intersect points. Indicate which of the intersect points are stable and which are unstable, giving your reasons.

c) Replace Vbias by a PN diode, anode on the left, and sketch the load line on a sketch of a) and indicate stability of resulting intersections.