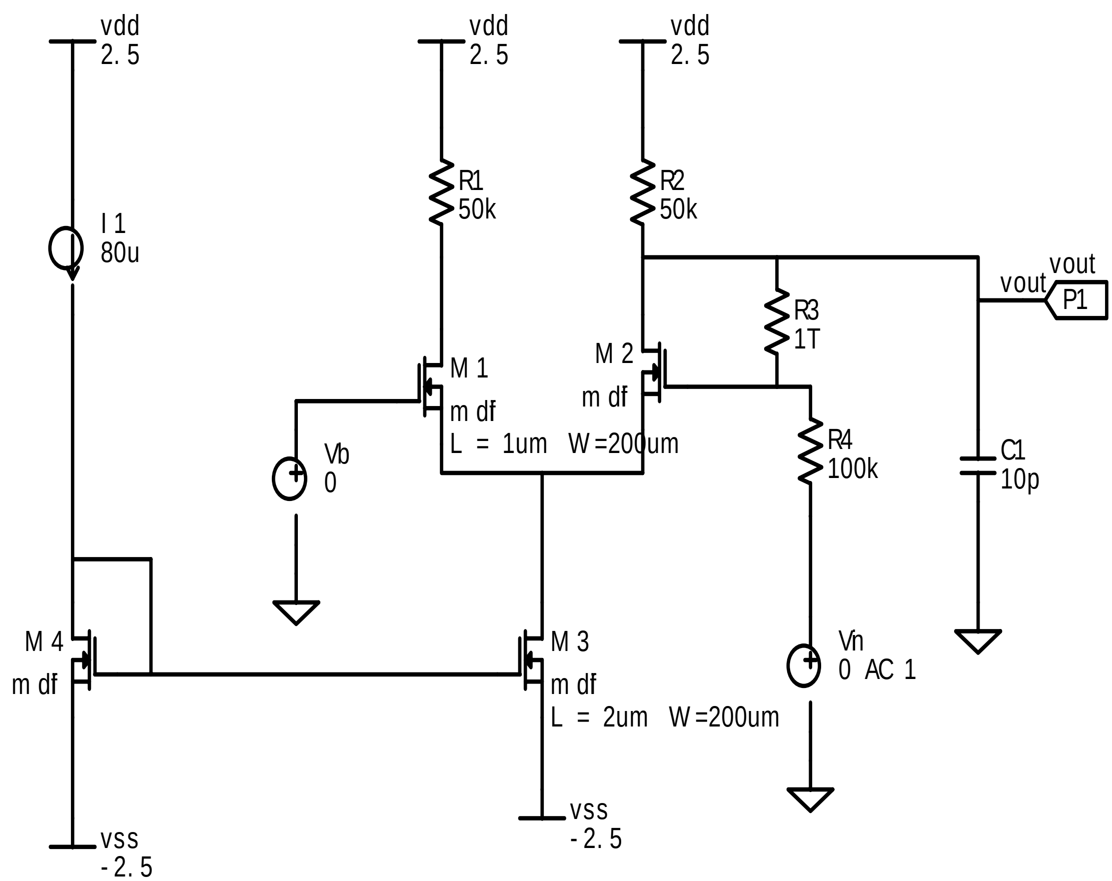
A differential pair amplifier with inverting feedback: reduce R3 from 1T to enable feedback effects. To improve the DC sweep, R1 can be made smaller than R2.
It is easier to make this circuit work with larger supplies, such as 5v and –5v. Larger supplies would need adjustments of I1 and R1, R2.
Also, the bias current of 80uA can be increased, but then also adjust R2 to keep
The DC output bias near midrail.



Ib = 0.5*uCox*(W/L)*Vov^2

uCox = 100uA/V^2 = 0.1mA/V^2 W/L = 100 when Ib = 50uA = 0.05mA,

then Vov = 0.1v.

gm = 2*Ib/Vov = sqrt(2*Ib*uCox*W/L) under the above conditions, gm = 1mA/V

Open loop gain is Vo/Vin = A(s) = Ao/(1+s/wp) with wp = 1/(RT*CL)

RT = RL || rds and Ao = gm*RT rds = ro = Va/Ib

if RT = 50K, then Ao = gm*RT = 50 if Va = 10v., and Ib = 50uA, then rds=200K

if CL = 10pF, then RT*CL = 0.5usec, and wp = 2 Megrad/sec, and fp = 318KHz

With feedback, closed loop gain is Acl(s) = K*A(s)/(1+A(s)*B),

Where B = R1/(R1 + RF) note: in above schematic RF is R3 and R1 is R4

K= -(1-B) for inverting amp.

Substituting A(s) into Acl(s), one can show that the closed loop gain is reduced and the closed loop pole is changed.

Acl(s) = [K*Ao/(1+AoB)] / [1 + s/wpcl] where wpcl = wp*(1+AoB) - closed loop pole

If the loading effects of the feedback network are included at the output node, then
Ao=gm'*RT' and wp = 1/(RT'*CL)
where gm' = gm-1/RF and RT' = RL||rds||RF