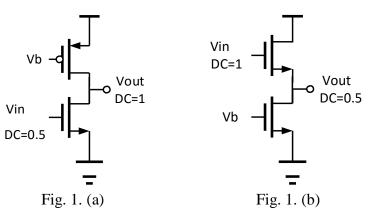
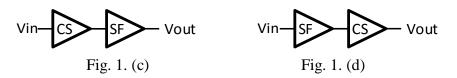
- 1. Use composer and hspice to simulate the common source and source follower as shown at Fig. 1 with Vdd=1.8V. Every one of MOS's cgtot, cstot, cdtot, and cbtot cannot have more than 100fF under your design. (70%)
 - (a) Design a common source with gain A1>120 and plot the output noise's spectrum as shown at Fig. 1.
 (a). Identify the corner frequency and pole of thermal noise. (10%)
 - (b) Design a source follower with gain A2>0.8 and plot the output noise's spectrum as shown at Fig. 1.(b). Identify the corner frequency and pole of thermal noise. (10%)
 - (c) Compare (a) with (b). Which one has higher output flicker noise? Which one has higher thermal noise's pole? Why? (10%)
 - (d) Find the total output noise power of CS and SF by integrating the spectrum. Which one is bigger? Why? (10%)
 - (e) Find the total input referred noise power of CS and SF based on the results of (a), (b), and (d). Which one is bigger? Why? (10%)



- (f) Connect CS and SF as shown at Fig. 1. (c) and find the total input referred noise power. (You are allowed to "slightly" adjust the bias condition to make sure the overall gain equal to A1*A2.) (5%)
- (g) Connect SF and CS as shown at Fig. 1. (d) and find the total input referred noise power. (You are allowed to "slightly" adjust the bias condition to make sure the overall gain equal to A1*A2.) (5%)
- (h) Comment on what makes the difference between (f) and (g). (10%)



- ♦ Before you start to simulate the .ac noise
 - 1. Find the title "Flicker and Thermal noise Model Parameters" in "cic018.1".
 - 2. Use the "replace all" to change value of the parameter into KF=1E-29.
 - 3. Hint: use ".noise V(vout) vin 10000"

- 2. Design a differential to single-ended amplifier as shown in Fig. 2 with Vdd=1.8V, $C_L=2p$ and use current mirror to generate V_b . (30%)
 - (a) Design a differential to single-ended amplifier to get voltage gain Av >40dB. (10%)
 - (b) Use the .op's parameters to calculate the pole of output node, mirrored node, and pseudo ground node. (10%)Use the .pz to check your calculation and simulate the bode plot. (10%)

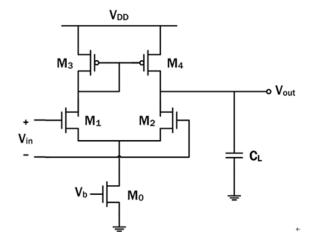


Fig. 2.

The following should be included in your report (a) schematic (b) HSPICE netlist & simulation file
 (c) waveform with cursor values (d) comments.