A. Rasmussen
3/12

100 pts Project #2 Simulation: (Hand in to homework locker by due date)
35 pts   HAND CALCULATIONS:

5 pts   1.   Draw a Hybrid-π equivalent circuit.
10 pts 2.   Calculation of overall Voltage Gain (from hybrid-π model).
10 pts 3.   Correct calculation of R_{out} (from hybrid-π model).
10 pts 4.   Correct calculation of Ri (from hybrid-π model).

65 pts   SIMULATION:

5 pts   6.   Printout of circuit schematic.
10 pts 7.   Verification that both I_D for ALL transistors are saturated.
            (Note: Handwrite or circle this on the schematic that shows all the printed voltages/currents.
                     You may have to run a transient simulation to get the values to show.)
15 pts 8.   DC verification of bias point for one stage:
            Need to show that that VGS> Vt and VDS>VGS-Vt for all transistors in the schematic
        •   Optionally may Show transfer function (DC sweep of input with output on y-axis).
15 pts 9.   AC Bode plots (shows operation works from 100Hz to 20kHz) of output divided by input
            (overall gain).
10 pts 10. Plot of output impedance vs. frequency. (May use directions on class webpage)
10 pts 11. Comparison table between hand and simulation for all I_D's (one for each stage), Voltage gain, R_{out}.

100 pts Project #2 Lab Work: Get this checked by your TA
25 pts   NOTEBOOK:

5 pts   1.   Check that their lab notebook is organized.
10 pts 2.   Description of the project.
10 pts 3.   Description of the design work.
5 pts   4.   Design Work:
1 pt   Schematic of the circuit (PSpice printout or drawn out by hand).
2 pts   The voltage gain and R_{out} hand calculations should correctly match their particular
             small-signal equivalent circuit and only be different by about 10%.
2 pts   Comparison of PSpice simulation versus measured values in particular the midband
             gain and R_{out}.

75 pts   PROTOTYPE:

10 pts 1.   Verification that the gain is at least 80V/V amplification. Phase does not matter.
10 pts 2.   1st stage has no clipping.
10 pts 3.   2nd stage has no clipping.
10 pts 4.   Correct amplification at their midband gain.
7.5 pts 5.   Correct amplification at 200 Hz.
7.5 pts 6.   Correct amplification at 18 kHz.
10 pts 7.   Verification that the amplifier works with the microphone/speaker circuit.
10 pts 8.   Verify that the circuit does not distort the voice signals.