303 Spring 2012– Homework 5 Due M 03/05/12 in class

1. (50 points, BJT npn and pnp amplifiers)
        Design an npn amplifier (using a 2N3904) for |IC|=5.2mA, RL=RC=1Kohm and RE=100Ohm. Repeat for a pnp one (using a 2N3906). Give the voltage gains, VCE and the range of values of the single battery VCC needed. For the base bias resistors choose one at a minimum of 1MegOhm. Run Spice to check your designs.

2. (50 points, NMOS and PMOS amplifiers)
        Replace the transistors in the circuits of problem 1 above by 4007 CMOS ones and calculate the new gains. Also run Spice to check your results.

3. (50 points; RC phase shift amplifier)
        For the RC phase shift amplifier of Figure 17.7, p. 1345, assume the amplifier is realized by an Op-amp inverter of the type used in Homework 1, Problem 2 with R2=10Meg.
        a) In terms of R and C find R1 needed for oscillations and give the oscillation frequency in Herz.
        b) Do a Spice run for R=10KOhm and C=20nFd and check against your calculations of part a). Submit your plots of amplifier output versus time.