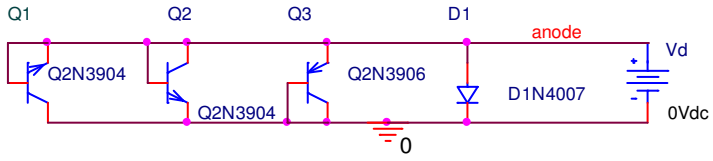
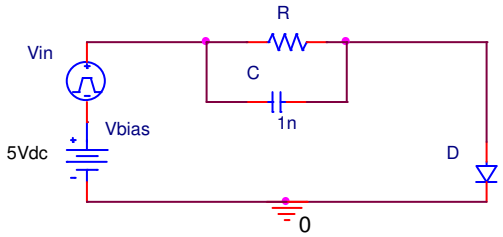
File: f:/coursesS09/303H/303S09Hmwk2.doc RWN 02/04/09

303 Spring 2009 – Homework 2 Due Th 02/12/09

1. Set up in Spice the following circuit and compare the diode curves.
   Plot in one "plot" the transistor diode characteristics and in another the diode's.
   Vary Vd from -1V to +0.8V and plot the terminal currents. Also plot the reversed bias currents and compare.



2. In the following circuit assume the diode is ideal in that it satisfies the exponential law, $i_D=IS(\exp(v_D/V_T) - 1)$, but with the saturation current of the 1N4007, that is, IS=14.11nA.
   a. Calculate V_D for I_D=3mA and with that the resistor value.
   b. Draw the small signal equivalent circuit assuming Vin is a small signal and set up the first order differential equation for the capacitor voltage.
   c. From the small signal equivalent circuit find the small signal current (downward) in the diode when Vin(t) is a unit step function of 1microVolt amplitude.



3. Using the mnmosis and mpmosis transistors find the width of the mpmosis transistor needed to set the output voltage, Vo, of the following circuit to 2.5V.