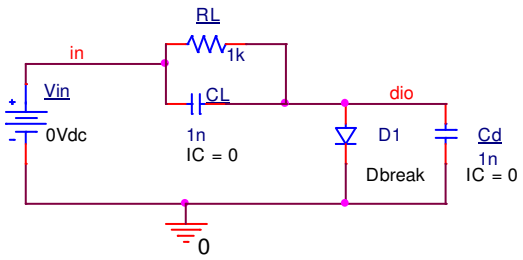
File: H:/coursesF15/303H/303HF15Hmwk1.doc RWN 09/03/15

303H Fall 2015 – Homework 1 Due Th 09/10/15

The PARAM part is in the SPECIAL library and Dbreak is in the BREAKOUT library

1. (60 points, Diode bias & Spice transient analysis)
   Set up the following circuit in Spice. Then do a DC run on Vin (abot 0 to 3V) along with a Parametric run to find RL to give a diode current of 1mA.
   a) Record 1) the resistance Rd of the resistor RL for the diode current to be 1mA, 2) the diode voltage, Vdio, at this diode current Q point, 3) the value of Vin for this Q point and 4) the conductance (slope), gd, of the diode current vs diode voltage at this Q point.



   b) Change the model for the diode via Edit PSpice Model using the model for the 1N4007 from the course web page and repeat part a). Comment on any differences.
   c) Make RL=Rd, the value found for the above Q point. Set up the small signal differential equation when the initial value of the capacitor Cd is 1mV greater than the Q point voltage.
   Do a transient analysis for about 50uSec in PSpice with that capacitor IC value. Submit your transient analysis curves of anode voltage and diode current.

2. (40 points, RLC circuits)

   a) Show that with the Spice G component one can obtain a negative resistance. Draw the resulting circuit, including a ground on both sides of the G component, and give the value of the negative resistance.