Dept EE, National Tsing Hua University EE2255 Electronics

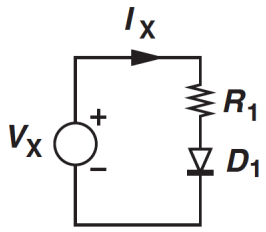
HW 1 (chapter 2, 3)

Due day: 2021.4.10. 10AM

Student ID: **Name:**

1. There is a circuit as shown in Fig. 1. When we input the *Vx* as 1V, the current *Ix* is 0.2mA. When we input the *Vx* as 2V, *Ix* is 0.5mA.

   (a) Please calculate the values of resistance of R1 and *Is* of diode D1.
   (b) Please use the large signal model to calculate the *Ix* current, when we input the *Vx* as 2.05V.
   (c) Please use the small signal model to repeat (b) and compare the *Ix* results of (b) and (c).
   (d) Please use the R1 value and Is of diode D1 in (a), and like (b) use LTspice operation point analysis to get the *Ix* with Vx as 2.05V.



2. Fig. 2 is a full-wave rectifier. In this circuit R1=100 KΩ, C1=50pF, and *Vin* is a 1MHz sinusoidal waveform from +3V to -3V.

   (a) Please plot the input and differential output voltage, when constant voltage model ($V_{D,on}$=0.8V) are used for diodes D1-D4 .
   (b) Please calculate the peak and the ripple voltages and mark them at the output waveform of (a).
   (c) Please use the constant voltage model in (a) for LTspice transient analysis to simulate this circuit. And compare the simulation results with (b).