Fall-2021 UM-SJTU JI Ve311 Homework #1

Instructor: Dr. Chang-Ching Tu

Due: 10:40 am, September 29, 2021 (Wednesday), online submission

Note:

(1) Please use A4 size papers.

(2) Please use the SPICE model below for simulation.

```
.model Dbreak D Is=1e-10 Rs=0 N=1 TT=0 Cjo=0pF
```

1. [Pspice Simulation of Si PN Junction Diode]
   (a) [25%] Use DC sweep to find out the diode's turn-on voltage (V_{on}).
   (b) [25%] For the circuit below, plot I_D vs V_{in} as V_{in} increases from -2 V to 2V. Use the constant voltage drop model and the V_{on} obtained in (a) to explain why the result is a linear increase rather than an exponential increase.
   (c) [25%] For the circuit below, plot V_{out} vs time and V_{in} vs time on the same graph, when $V_{in} = 2\sin(2\pi \times 100 \times \text{time})$. Use the constant voltage drop model and the V_{on} obtained in (a) to explain the result.
   (d) [25%] For the circuit below, plot V_{out} vs time and V_{in} vs time on the same graph, when $V_{in} = 2 + 0.01\sin(2\pi \times 100 \times \text{time})$. Use the constant voltage drop model and the V_{on} obtained in (a) to explain the result.