UNIVERSITY OF CALIFORNIA, SAN DIEGO

Electrical and Computer Engineering Department

ECE 65 – Fall 2019

Components and Circuits lab

Midterm Exam

Closed books, one one-sided cheat sheet, and calculators are allowed

Electronic devices are not allowed.

Please put all answers in the provided sheets.

Be sure to write your name and PID on **all pages**.

Please do not begin until told. Show your work. Good luck.

All electronic devices including cell phones must be turned off and stored away in a backpack or a purse. Anyone caught with such a device on their person during the exam will be charged with academic dishonesty.

Problem 1. (10 points)

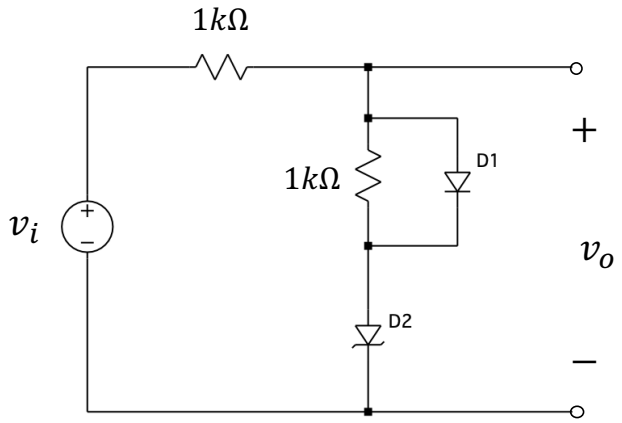
The diodes in the below circuit have $V_{D0} = 0.7\ V$, and $V_Z = 3\ V$.

a) Write the possible cases of the operation of the diodes.

b) For each case, include the calculation of finding the relationship between v_o and v_i and the range of v_i.

c) Sketch the output signal when $v_i = 3 \sin(\omega t)$. You do not need to label the time axis.

Show your work.



Problem 2. (2 points)

a) Design a diode waveform shaping circuit that would have the below transfer function. You can use PN junction diodes and Zener diodes with $V_{D0} = 0.7\ V$, $V_Z = 1.3\ V$, DC voltage sources, and resistors in your design.

b) Write the possible cases of the operation of the diode(s) in your designed circuit, and for each case, include the calculation of finding v_o.