

Name

PID

**UNIVERSITY OF CALIFORNIA, SAN DIEGO**

Electrical and Computer Engineering Department

ECE 65 – Fall 2020

*Components and Circuits lab*

Midterm Exam1

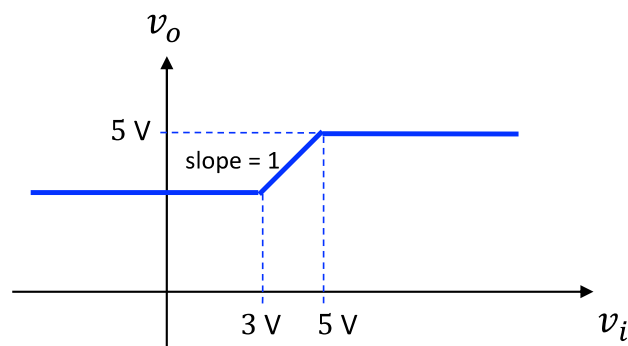
You should submit your handwritten solutions in a PDF format to Gradescope by Wednesday, 10/21, at 11:50 am (Pacific Time).

**Problem 1.** (15 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  $V_{D0} = 0.7\text{ V}$ ,  $V_Z = 1.3\text{ V}$ , DC voltage sources, and resistors in your design. You can use any combination in your design.

- b) Write **two possible cases** of the operation of the diode(s) in your designed circuit, and for each case, include the **calculation of finding  $v_o$**  and **the range of  $v_i$** . Show your work.

**Problem 2.** (3 points)

Modify the circuit that you designed in problem 1 such that the voltage gain in the nonlimiting range is  $0.5\text{ V/V}$ . Sketch the modified circuit.