ECE 320 - Quiz #2 - Name

Semiconductors, pn Junction, ideal diodes - Fall 2020

1a) Silicon diodes have a 0.7V drop across them (approximately). What is the cause of this 0.7V drop?

1b) Why does the votlage drop across a silicon diode decrease as temperature goes up?

2) The resistance of a thermistor is given by

$$R = 1000 \cdot \exp\left(\frac{3905}{T} - \frac{3905}{278}\right) \Omega$$

where T is the temerature in degrees Kelvin (C + 273). Find the resistance and the temperature if the voltage at V1 is 3.50V for the following circuit.

Resistance (R)	Temperature (T)		



3) Load Lines: Draw the load line for the following circuit and from the graph, determine Vd and Id

Load Line	Vd (Votls)	Id (mA)	



4) The VI characteristics for a diode are

$$V_d = 0.052 \ln (10^8 \cdot I_d - 1)$$
 Volts
 $I_d = 10^{-8} \left(\exp \left(\frac{V_d}{0.052} \right) - 1 \right)$ Amps

Write the voltage node equations for the following diode circuit. (you don't have to solve - just give the equations) Note: You should end up with six equations:

- Three for the diodes: $\{Id1, Id2, Id3\}$ in terms of $\{V1, V2, V3\}$, and
- Three for the voltage nodes



5) Assume ideal diodes. Determine the voltages and currents assuming ideal silicon diiodes (Vf = 0.7V)

V1	V2	V3	Id1	Id2	Id3



6) Assume ideal siliicon dioes. Determine the voltage, V1, and the currents, I1..I4

V1	I1	I2	I3	I4



Bonus! Where is the error in the following proof that 1 = 2?

Assume:
$$a = b = 1$$

 $ab = b^2$
 $a^2 - ab = a^2 - b^2$
 $a(a - b) = (a + b)(a - b)$
 $a = a + b$
 $1 = 2$