THEVENIN'S THEOREM CAN BE GENERALIZED TO ANY TWO TERMINAL NETWORK OF RESISTORS ($Z_R = R$), INDUCTORS ($Z_L = jωL$) AND CAPACITORS ($Z_C = \frac{1}{jωC}$) IS $\mathcal{Z}$

A SINGLE COMPLEX IMPEDANCE IN SERIES WITH A SINGLE SIGNAL SOURCE.

EXERCISE: YOU HAVE A TEMPERATURE SENSOR AND CONTROLLER. IT STOPS WORKING, TELL ME WHAT ORDINARY LABORATORY EQUIPMENT YOU COULD USE TO REPLACE IT. DIVIDE INTO TERMS OF $Z$ AND START THINKING.

BASICS OF DIODES:

1. CURRENT FLOWS (ALMOST) ONLY ONE WAY.
2. VOLTAGE DROP IS (ALMOST) CONSTANT.

USE SLOPE OF $V-I$ CURVE ( = DYNAMIC IMPEDANCE )

EXAMPLE: $R = 300Ω$

$V_{IN}$ $V_{OUT}$

DIODE, IN 47.33

$V_{IN}$ VARIES FROM 15 TO 20 VOLTS. HOW MUCH DOES $V_{OUT}$ VARY?

(a) WHAT IS MAXIMUM CURRENT THROUGH DIODE?

$\Rightarrow$ LOOK UP ZENER VOLTAGE ( = 5.1 VOLT )

$\Rightarrow$ $I_{MAX} = \frac{20 - 5.1}{300} \approx 50$ mA

(b) WHAT IS DYNAMIC IMPEDENCE AT 20V, ?

7.0 Ω

$\Rightarrow$ $\Delta V = R_{DYN} \Delta I$  \[ΔV = 0.12$ VOLT$ schooling between 15V. and 20V. \]