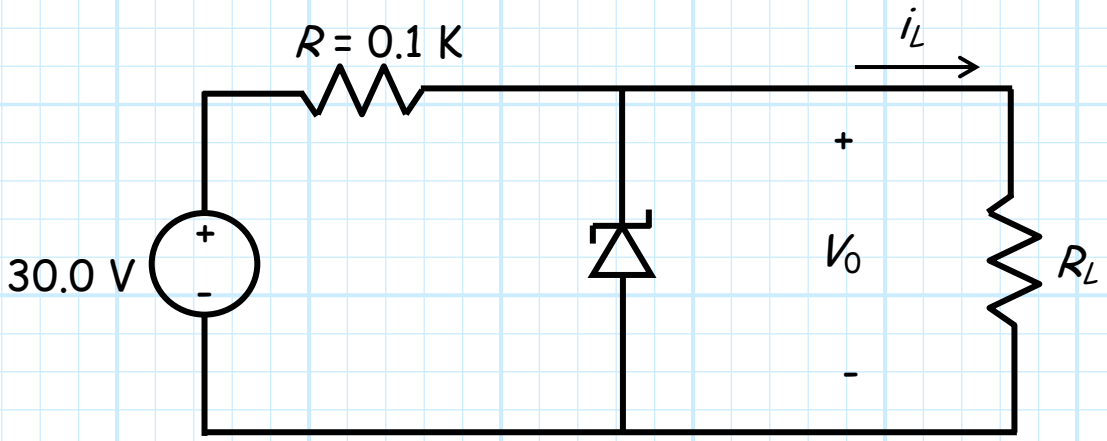
Special Problem 3.4-13

Consider this **shunt regulator**, where the zener diode and load resistor are yet to be determined.



Answer these four **independent** and **uncoupled** questions.

1. **If** the load resistor happens to have a value of R_L =0.4 K, determine the **maximum** value of **zener diode breakdown voltage** V_{ZK} such that the output to be **regulated** at a voltage of $V_O = V_{ZK}$

2. **If** the zener diode happens to have a breakdown voltage of V_{ZK} =20.0 V Determine the **maximum** value of **load current** i_L such that the output to be **regulated** at a voltage of V_O=20.0 V

3. Say the load current i_L increases **by** 10 mA, resulting in a slight, 1.0 mV **decrease** of the regulated output voltage. Determine the **dynamic (i.e., incremental) resistance** of the zener diode.

4. Say the source voltage is increased from 30.0 V **to** 35.0 V, resulting in a slight, 10.0 mV **increase** of the regulated output voltage. Determine the **line regulation** of the regulator.