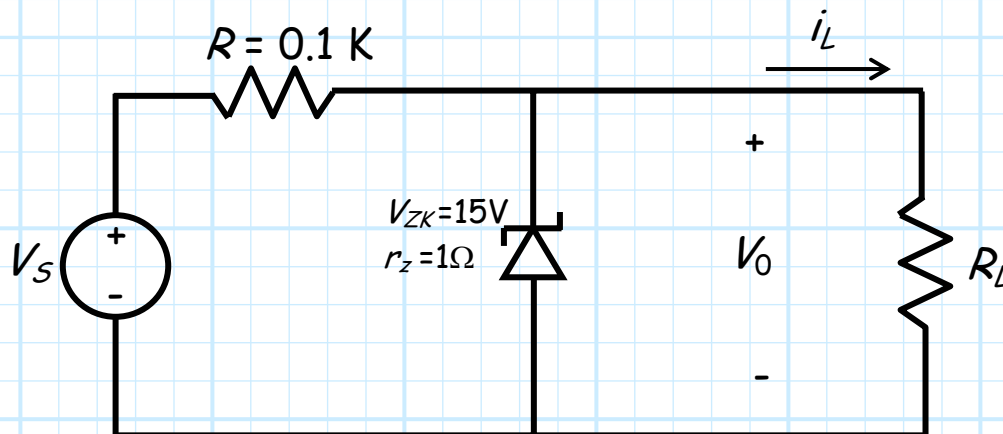


Special Problem 3.4-12

Consider this **shunt regulator**, made with a zener diode whose **breakdown voltage** is 15.0 V, and whose **incremental resistance** is 1.0 Ω (i.e., $r_z = 0.001\text{K}$).



1. If the source voltage is 25.0 V (i.e., $V_S = 25.0\text{ V}$), determine the **minimum** value of load resistor R_L required for the output to be **regulated** at a voltage of $V_O = 15.0\text{ V}$.
2. Determine the **minimum** value of source voltage V_S required to provide a **regulated** output voltage of $V_O = 15.0\text{ V}$ if the load current is $i_L = 150\text{ mA}$.
3. Determine the precise **change** in regulated output voltage V_O if the source voltage V_S is increased by 2.0 Volts.
4. Determine the precise **change** in the regulated output voltage V_O if the load current i_L is increased by 10 mA.

Hint: **the answer to parts 3 and 4 is not zero.**