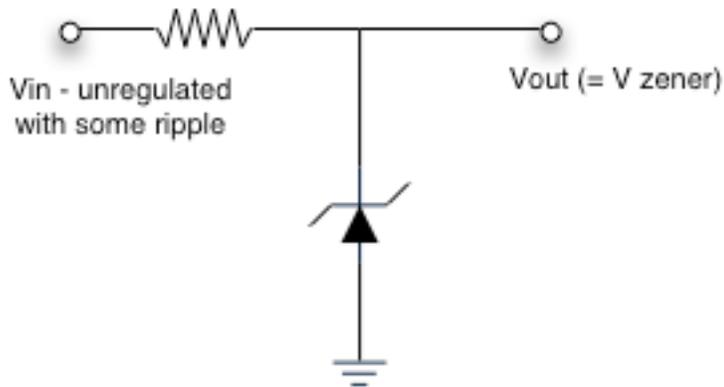# Problem HH 2.3

The simplest regulated supply of voltage is a zener such as in the figure below.

Some current must flow through the zener so you choose:

$$\frac{V_{in} - V_{out}}{R} > I_{out}(\text{max})$$

Because V_{in} is not regulated, you use the lowest value of V_{in} that might occur for this formula. Also the zener must be able to dissipate power:

$$P_{zener} = (\frac{V_{in} - V_{out}}{R} - I_{out}) \times V_{zener}$$

For worst-case design, you would use $V_{in}(\text{max})$, R_{min} and $I_{out}(\text{min})$.

Design a +10 volt regulated supply for load currents from 0 to 100 mA; the input voltage is +20 to +25 volts. Allow at least 10mA zener current under all (worst-case) conditions. What power rating must the zener have?