3. Given

\[ V_1 = 200\,\text{V}, \quad V_2 = 100\,\text{V}, \quad R_1 = 50\,\Omega, \quad R_2 = 50\,\Omega \]

**a) Find \( V_2 \) by inspection or inspection.

\[ V_2 = 100\,\text{V}. \quad \text{Why?} \]

The 200V are in parallel

\[ 200\,\text{V} \Rightarrow 200\,\text{V} \text{ across the 50\,\Omega resistor} \]

\[ R_1 \text{ and } R_2 \text{ are in parallel} \Rightarrow \]

\[ V_1 = 100\,\text{V} \text{ across both } R_1 \text{ and } R_2 \]

\[ -200 + V_2 + 100 = 0 \]

\[ V_2 = 100\,\text{V}. \]

**b) Find at least one pair of valid values for \( R_1 \) and \( R_2 \).

\[ V_1 = V_2 \Rightarrow R_{eq} = \frac{R_1 \cdot R_2}{R_1 + R_2} = 50\,\Omega \]

\[ R_1 = R_2 = 100\,\Omega \text{ works} \]

Others??
This example uses MATHCAD to help solve a circuits design problem. The circuit is given below:

The question is what values of R1 and R2 are valid solutions.

The values of R1 and R2 must satisfy the equation: \(50 = \frac{R1 \times R2}{R1 + R2}\)

Let's set up some trial values for R1 and calculate the values R2. If R1 is known, then we can write the following equation:

\[R2 = \frac{50 \times R1}{(R1 - 50)}\]

Set up a vector for R1 over the values of interest.

Write an expression for R2 as a function of R1:

\[R2(R1) := \frac{R1}{50 - \frac{R1}{(R1 - 50)}}\]

I want to show the 50 Ohm value.

\[Rb := 50\]

I also want to show the \(R1 = R2 = 100\) Ohm case.

\[Re := 100\]

Shown in the Figure is \(R2\) plotted as a function of \(R1\).