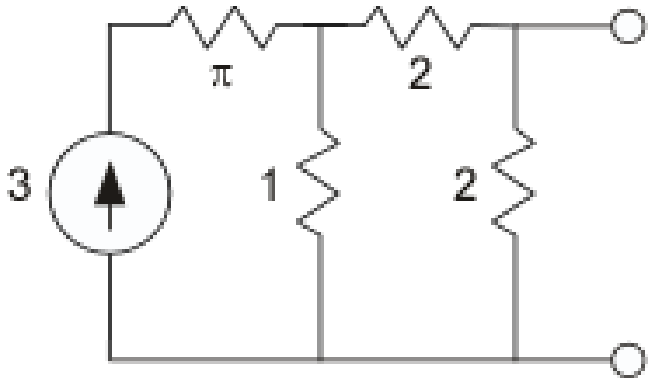
# Feedback — Circuit Exercises

You submitted this homework on **Wed 3 Apr 2013 2:05 PM CDT -0500**. You got a score of **0.00** out of **8.00**. You can attempt again, if you'd like.

## Question 1

Consider the following circuit.




Find the values of the Thévenin equivalent voltage source and the Thévenin equivalent resistance for this circuit. Express your answer as a pair of numeric values, with the Thévenin equivalent voltage coming first. For example, if $V_{\text{eq}} = 5$ and $R_{\text{eq}} = \sqrt{2}$, your answer should be entered as `5 1.4`.

**You entered:**

| Your Answer | | Score | Explanation |
|---|---|---|---|
| | ✘ | 0.00 | |
| Total | | 0.00 / 2.00 | |

**Question Explanation**

The $\pi\Omega$ resistor does not affect the answer (or the circuit's behavior). The reason is that the current source supplies its current regardless of the voltage across it. Thus, the current flowing out of the $\pi\Omega$ resistor equals 3 and the voltage across it

is "taken up" by the current source's voltage. The same kind of situation occurs for a resistor placed in parallel with a voltage source.

Using current divider, the current through the $2\Omega$ resistor is $3 \cdot \frac{1}{1+4} = \frac{3}{5}$.

Consequently, the open-circuit voltage at the terminals is $\frac{6}{5} = 1.2$ volts.

To find the equivalent resistance, set the current source to zero (which makes it an open circuit). From the viewpoint of the terminals, the circuit appears to be $2||(2+1) = \frac{2 \cdot 3}{2+3} = \frac{6}{5} = 1.2\Omega$.

# Question 2

Find the values of the Mayer-Norton equivalent current source and the Mayer-Norton equivalent resistance for the same circuit. Express your answer as a pair of numeric values, with the equivalent source coming first. For example, if $I_{\text{eq}} = 5$ and $R_{\text{eq}} = \sqrt{2}$, your answer should be entered as `5 1.4`.

**You entered:**

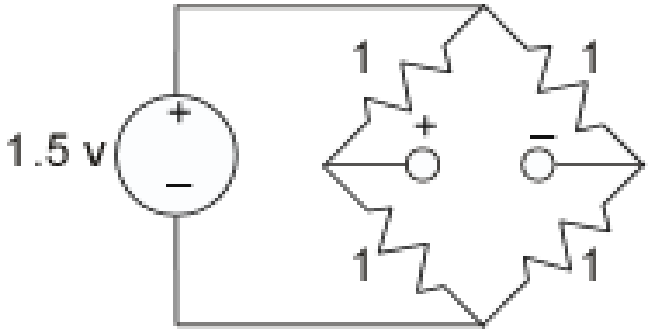
| Your Answer | | Score | Explanation |
|---|---|---|---|
| | ✘ | 0.00 | |
| Total | | 0.00 / 2.00 | |

**Question Explanation**

The Mayer-Norton and Thévenin equivalent resistances equal each other. To find the equivalent current source, we place a short-circuit across the terminals. In this situation, the current source "sees" a $1\Omega$ resistor in parallel with a $2\Omega$ resistor. Consequently using current divider, the current flowing through the short circuit is $3 \cdot \frac{1}{1+2} = 1$ ampere.

# Question 3

Consider the following circuit.




Find the values of the Thévenin equivalent voltage source and the Thévenin equivalent resistance for this circuit. Express your answer as a pair of numeric values, with the Thévenin equivalent voltage coming first. For example, if $V_{\text{eq}} = 5$ and $R_{\text{eq}} = \sqrt{2}$, your answer should be entered as `5 1.4`.

**You entered:**

| Your Answer | | Score | Explanation |
|---|---|---|---|
| | ✘ | 0.00 | |
| Total | | 0.00 / 2.00 | |

**Question Explanation**

The output voltage equals the difference of the voltages of the two $1\Omega$ resistors at the bottom of the circuit. Because of the resistor values, these two voltages **both** equal $1.5 \cdot \frac{1}{1+1} = 0.75$ volts. Consequently, $V_{\text{eq}} = 0$.

To find the equivalent resistance, set the voltage source to zero. From the viewpoint of the terminals, we now have the "left" resistors in parallel, which is in series with the parallel combination of the "right" resistors. This structure gives us $1\|1 + 1\|1 = \frac{1}{2} + \frac{1}{2} = 1\Omega$. Thus, from the viewpoint of the terminals, this circuit is a $1\Omega$ resistor!

# Question 4

Find the values of the Mayer-Norton equivalent current source and the Mayer-

Norton equivalent resistance for the same circuit. Express your answer as a pair of numeric values, with the equivalent source coming first. For example, if $I_{\text{eq}} = 5$ and $R_{\text{eq}} = \sqrt{2}$, your answer should be entered as `5 1.4`.

**You entered:**

| Your Answer | | Score | Explanation |
|---|---|---|---|
| | ✘ | 0.00 | |
| Total | | 0.00 / 2.00 | |

**Question Explanation**

Since $I_{\text{eq}} = \dfrac{V_{\text{eq}}}{R_{\text{eq}}}$, the equivalent current source equals zero. The Mayer-Norton equivalent resistance **always** equals the Thévenin equivalent resistance, which we have found to be $1\Omega$.