Massachusetts Institute of Technology
Department of Electrical Engineering and Computer Science
6.061/6.979 Introduction to Power Systems

Problem Set 1

Issued February 2, 2005
Due February 9, 2005

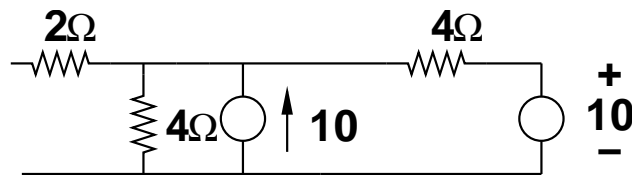**Reading Assignment:** Class Notes, Chapter 1

Figure 1: Simple Circuit

Problem 1: For the simple circuit shown in Figure 1, find:

1. The open circuit voltage,
2. The short circuit current

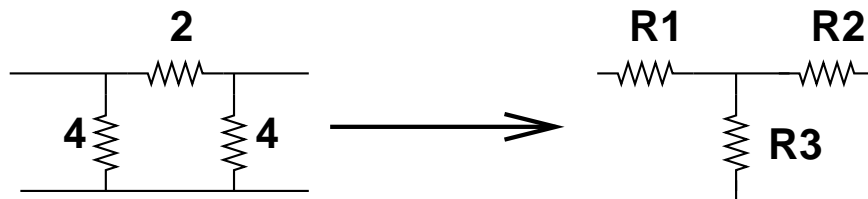Draw the Thevenin and Norton equivalent circuits.

Figure 2: Simple Circuits

Problem 2: Figure 2 shows two circuits, one with resistor values, the other with symbols. Show that these two circuits are equivalent if the values represented by the symbols are chosen correctly. Find the value of the symbols.
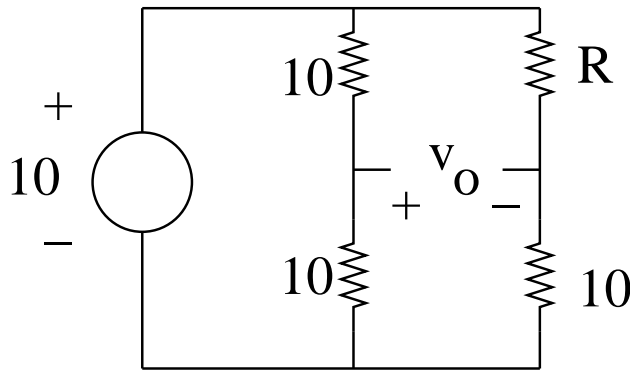
Figure 3: Wheatstone Bridge

Problem 3: With reference to Figure 3, find the output voltage v_0 for two cases:

1. If $R = 9\Omega$,
2. If $R = 11\Omega$

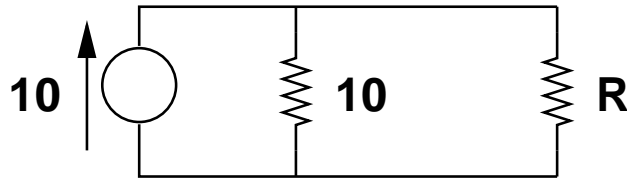Using MATLAB, find and plot the output voltage v_0 for the range of that resistance $9 < R < 11$.

Figure 4: Power Dissipating Circuit

Problem 4: Figure 4 shows a resistor driven by a circuit whose Norton equivalent is shown.

1. For what value of resistance R is the power dissipated greatest? What is that power dissipation?

2. Using MATLAB, plot power dissipated in that resistor over the range of $.1\Omega < R < 1000\Omega$