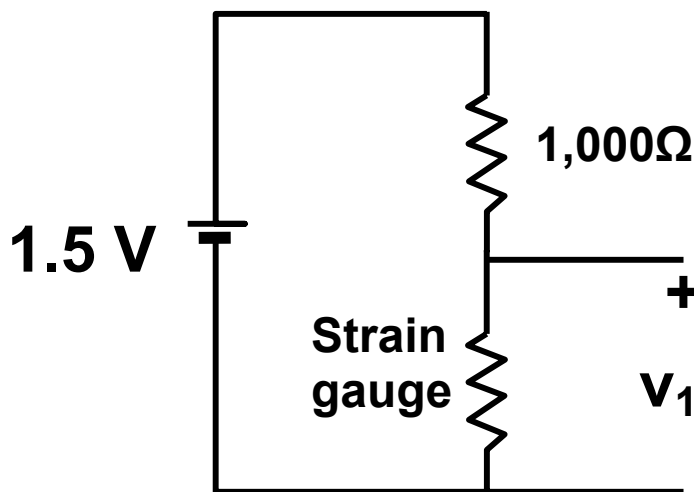**Problem Set 4**
Due Feb. 6, 2003
Reading Assignment: Textbook pp. 47-48, 61-70

1. A liquid metal strain gauge has nominal resistance of 50 Ohms and has a length of 30 cm when there is no strain. This strain gauge is placed in the voltage divider circuit shown below and experiences tensile displacements ranging from 0 to 10 cm. Plot a graph of the voltage output of the circuit as a function of strain. What is the sensitivity of this strain sensing circuit? How does it compare to a foil strain gauge (Problem set 3, problem 1)? Is there any offset voltage at zero strain, and if so how much is there?

2. Find the Thevinen equivalent circuit for the strain gauge in Problem 1 when the strain is 9 microstrain.

3. A series ohmmeter circuit uses a 100 µA full-scale analog meter that has an internal resistance of 150 Ohms. A 1.5V battery powers the circuit. Draw the circuit for this ohmmeter. What resistance must be in series with the meter to prevent it from going off scale? Plot the meter reading in microamperes as a function of the measured resistance.

Circuit for problem 1