EE426: Fundamentals of Instrumentation

Problem Set 4

1. 9.6
2. 9.8
3. 9.10 Note that in Figure 9.11, resistors R1 and R3 undergo tensile strain, so that their resistance is given by Ro(1+Ge), where G is the gauge factor and e is the strain, while R2 and R4 undergo compressive strain so that their resistance is given by Ro(1-Ge).
4. The equation [9.31] assumes that RIN for both branches of the differential circuit is about equal to R0/2.
   1. Using the feedback resistor value calculated above, re-analyze this circuit in the case of full deflection without using this assumption. What is the resulting output signal?
   2. Was the assumption made in the text valid? What conditions for the values of the resistors in the bridge must be met for [9.31] to be reasonable?
   3. Explain why an instrumentation amplifier might be preferable to a differential amplifier in the cases where this assumption breaks down. Sketch the circuit for this system with this substitution.
5. 9.11
6. 9.17