

ME 3901 Homework:
Problems are due Friday 4/1/1 by midnight
Electronically

- 1.) (10 pts) A resistance arrangement of 50 ohms is desired. Two resistances of 100 ohms +/- 0.10 ohms and two resistances of 25.0 ohms +/- 0.02 ohms are available. Which should be used, a series arrangement or a parallel arrangement? Calculate the uncertainty for each arrangement.
- 2.) (10 pts) Calculate the probability of filling an inside straight with one draw from the remaining 48 cards of a 52-card deck.
- 3.) (10 pts) A voltmeter is used to measure a known voltage of 100V. Twelve percent of the readings are within 0.5V of the true value. Estimate the standard deviation for the meter. What is the probability of an error of 1.75V?
- 4.) (30 pts) In heat-exchanger applications a long-mean temperature is defined as:

$$\Delta T_m = \frac{(T_{h1} - T_{c1}) - (T_{h2} - T_{c2})}{\ln \left(\frac{(T_{h1} - T_{c1})}{(T_{h2} - T_{c2})} \right)}$$

where the 4 temperatures are measured at appropriate inlet and outlet conditions for the heat-exchanger fluids. Assuming that all four temperatures are measured independently with the same uncertainty, ω_T , derive an expression for the uncertainty of ΔT_m in terms of the 4 temperatures and the value of ω_T . Recall that the percentage uncertainty is:

$$\frac{\omega_{\Delta T_m}}{\Delta T_m} * 100$$