Propagation of Error

As you work through the steps in the lab procedure, record your experimental values and the results on this worksheet. Use the exact values you record for your data to make later calculations.

Procedure A: Calibrating a power supply using a voltmeter

CHECKPOINT 1: Ask your TA to check your circuit connections.

Complete the table below.

Data Table 1

Trial #	Output Voltage (V)	Measured Voltage (V)
1		
2		
3		
4		
5		
6		
7		

CHECKPOINT 2: Ask your TA to check your table values, graph, and calculations.

Procedure B: Calibrating a power supply using a voltage probe

Complete the table below.

Data Table 2

Trial #	Output Voltage (V)	Measured Voltage (V)
1		
2		
3		
4		
5		
6		
7		

CHECKPOINT 3: Ask your TA to check your table values, graph, and calculations.

Compare your graphs from the two sets of measurements. Do they agree? (Calculate the slopes and their uncertainties from your data.)

Is the power supply linear to within experimental errors? (Are both percent uncertainties less than or equal to 10%?)

Procedure C: Resistance measurement and standard deviation

Complete the table below.

Data Table 3

Trial #	$R(\Omega)$
1	
2	
3	
4	
5	
6	
7	
8	

What is the average value of resistance?

What is the percent uncertainty in the measurement of resistance?

Enter the color code found on your resistor:
band 1:

band 2:

band 3:

band 4:

Based on the above color code, what is the percent uncertainty in the theoretical value of resistance?

What is the theoretical value of resistance determined from the color code?

Does your measured value of R agree with the manufacturer's value within experimental errors? (Consider your resistances and uncertainties exactly as you have entered them.)

CHECKPOINT 4: **Ask your TA to check your table values and calculations.**

Procedure D: Resistances in series

Complete the table below.

Data Table 4 - series combination

Trial #	$R(\Omega)$
1	
2	
3	
4	
5	
6	
7	
8	

What is the average value of resistance for the series combination?

What is the percent uncertainty in the measurement of resistance?

What is the theoretical value of the equivalent series arrangement determined from calculation?

What is the percent uncertainty in the theoretical value of resistance?

Does your measured value of R_{series} agree with the manufacturer's value within experimental errors? (Consider your resistances and uncertainties for the series combination exactly as you have entered them.)

Procedure E: Resistances in parallel

Complete the table below.

Data Table 5 - parallel combination

Trial #	$R(\Omega)$
1	
2	
3	
4	
5	
6	
7	
8	

What is the average value of resistance for the parallel combination?

What is the percent uncertainty in the measurement of resistance?

What is the theoretical value of the equivalent parallel arrangement determined from calculation?

What is the percent uncertainty in the theoretical value of resistance?

Does your measured value of R_{parallel} agree with the manufacturer's value within experimental errors? (Consider your resistances and uncertainties for the parallel combination exactly as you have entered them.)

<u>**CHECKPOINT 5**</u>: **Ask your TA to check your table values and calculations.**