Lab 2

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Procedure:

- The volume of a mug was determined by measuring its inner diameter and depth. These measurements were also completed in Lab 1, so I borrowed the results from that lab. Uncertainty was propagated directly from the length measurements.
- The mug was placed under a faucet with a low flow rate. A digital timer was used to determine the time it took for the mug to fill completely. It is useful to use a low flow rate because it will give more time to react to the timer when the mug is filled.
- To combat errors in human timing, this measurement was repeated 20 times. During these 20 trials, the faucet was untouched so as not to disturb the flow rate between trials. The uncertainty from all of these trials will be represented by the standard deviation of the mean.

Results:

Volume	200	mL
Uncertainty	20	mL

Time (s)	Volume (mL)	Rate (mL/s)
	=B$5	=B8/A8
Mean		
=AVERAGE(data)		
St. Dev		
=STDEV(data)		
St. Dev. Of Mean		
=STDEV(data)/SQRT(COUNT(data))		

***Notice**: Data is copied into a neat table that highlights the results from all calculations. This is referenced dynamically and not copied by hand. If numbers are updated in the spreadsheet, the summary will be updated too.*

There is no need to explain how you did the calculations if the excel file is present. If it isn't, a quick copy of the formula from the formula bar will do. Don't worry about formatting a nice equation in Word.

Summary

	Value		Abs. Uncertainty		Rel. Uncertainty
Volume	=A5	mL	=A6	mL	=B20/D20
Time	=A12	s	=A16	s	=B21/D21
Flow Rate (Calc)	(Formula)	mL/s	(Formula)	mL/s	(Formula)

***Notice**: An "error analysis" report is already built into this Excel sheet. If anything, you might only need to explain, "This data here has a reasonable/unreasonable agreement with my results from a previous method."*

You might also consider rounding to the appropriate number of sig figs here to show me that you know how to relate exact computations to real-world estimates.

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Analysis:

- It proved difficult to determine when the mug was first full for two reasons:
    - The water from the tap introduced bubbles into the mug, making the water level turbulent.
    - The bottom of the sink where the mug was sitting had a slight slope to it. This made water leak out one side of the mug before it was completely full.
    - Both of these problems caused me to believe the mug was full sooner than it actually was (as I determined "full" when water first started spilling over the side). This means my times are shorter than they should be, so my flow rate is probably a little higher than it should be.
- Measuring the volume of the cup by ruler seemed inaccurate from the previous lab. When we compared the volume by ruler to the volume by measuring cup, we got very different results. Even though my propagated least-count precision is fairly small in my volume uncertainty using the ruler, I disbelieve this because of my experience in the variability of this method. I will estimate that the relative uncertainty is more along the lines of 5% with this method, which means my uncertainty in my flow rate should also be around 5% (even though my careful math tells me otherwise).

Other comments:

Notice the "short-and-sweet" format.

- *Each procedural step has its own logical bullet point.*
- *Sections are given appropriate headings.*
- *Each bullet point in the analysis addresses one logical topic.*
- *Complete sentences are not necessary if the logic is separated into unique ideas.*
- *It is quick to scan results*