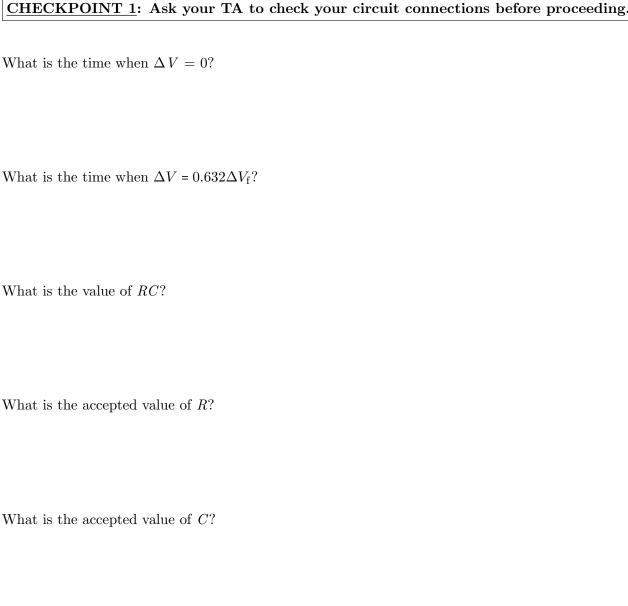
Charge and Discharge of a Capacitor

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.

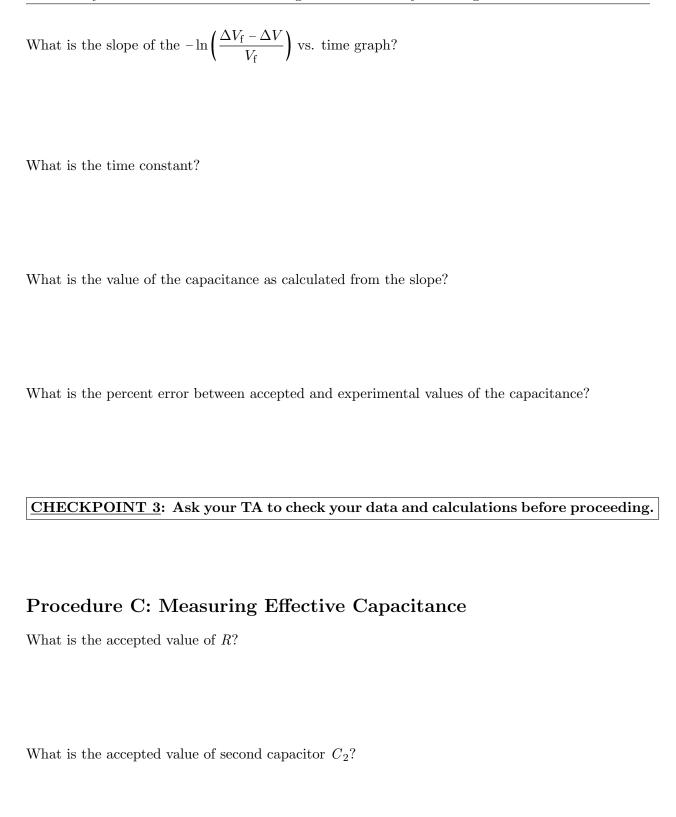
Procedure A: Time constant for an RC circuit

CHECKPOINT 1: Ask y	zour TA te) check vour	· circuit c	connections	before	proceeding.
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What is the experimental value of C ?					
W/1 / · /1		1.4			
what is the j	perce	nt error between	accepted and experiment	tal values of capacitance?	
CHECKPO	OIN'	Γ2: Ask your T	'A to check your data a	and calculations before p	roceeding.
			· ·		
Procedu	re E	3: Calculatio	on of Capacitance	e by Graphical Met	hod
When charging	ng th	e capacitor, what	final value ΔV_{f} does th	e voltage approach?	
	. 1				
Complete the table below. For accuracy in later calculations, be sure to enter your values to at least three decimal places.					
Data Table	1				1
$\Delta V (V)$)	Time (s)	$(\Delta V_{ m f}$ – $\Delta V)/\Delta V_{ m f}$	$-\ln[(\Delta V_{ m f}-\Delta V)/V_{ m f}]$	

Time (s)	$(\Delta V_{ m f}$ – $\Delta V)/\Delta V_{ m f}$	- $\ln[(\Delta V_{ m f}$ - $\Delta V)/V_{ m f}]$
	Time (s)	Time (s) $(\Delta V_{\mathrm{f}} - \Delta V)/\Delta V_{\mathrm{f}}$



What is the theoretical	l value of the	effective car	pacitance of the	parallel combination?
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What is the value of the initial voltage for the discharging process?

Complete the table below. For accuracy in later calculations, be sure to enter your values to at least three decimal places.

Data Table 2

Data Table 2			
$\Delta V (\mathrm{V})$	Time (s)	$\Delta V/\Delta V_0$	$-\ln(\Delta V/\Delta V_0)$

What is the slope of the $-\ln\left(\frac{\Delta V}{\Delta V_0}\right)$ vs. time graph?

What is the time constant?

Physics Labs for Scientists and Engineers - Electricity and Magnetism Worksheet Lab 5-
What is the effective capacitance of the parallel combination as calculated from the slope?
What is the percent error between the experimental and theoretical values of C_{eff} ?
CHECKPOINT 4: Ask your TA to check your data and calculations.
CHECKI OHVI 4. Ask your IA to check your data and calculations.