PHY 482 **Name:** _____
Spring 2020 **Quiz #3**
February 14, 2017 **Time Limit: 25 minutes**

Answer the questions in the spaces provided on the question sheets, **making sure to include units**. If you run out of room for an answer, continue on the pages marked **Extra Work**, but indicate that you have done so.

Your answers should include explanations where necessary (or requested) as well as appropriate units and labels (as needed). Write legibly – If we can't read it, we can't grade it. If you have a question, ask your instructor not your classmate.

Problem	Points	Score
1	100	
Total:	100	

This quiz is to be completed alone without the aid of other outside resources. We have also provided a formula sheet for you.

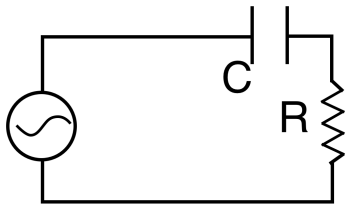
By signing below, you are agreeing that you have not received unauthorized assistance during this exam, which includes but is not limited to additional crib sheets & note cards, textbooks, course notes, and/or other stored formulas.

Signature: _____

Useful formulas:

$$\widetilde{V} = \widetilde{I}\widetilde{Z} \qquad \widetilde{Z}_R = R \qquad \widetilde{Z}_L = i\omega L \qquad \widetilde{Z}_C = \frac{-i}{\omega C}$$

1. Consider the following RC circuit that is driven using a variable supply that is set to following sinusoidal driving: $V(t) = V_0 \cos(\omega t)$.



You will use phasors to determine the steady state current in this circuit.

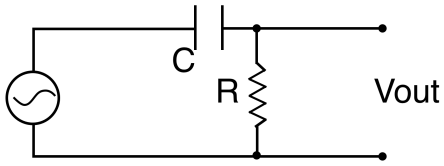
(a) (10 points) What is the impedence of this circuit, $\widetilde{Z}$?

(b) (25 points) As you know, the impedance, $\widetilde{Z}$, can be written as the product of its magntiude and phase: $\widetilde{Z} = |\widetilde{Z}|e^{i\phi}$. Determine the magnitude and phase of the impedance. *Hint: it may help to draw a triangle in the complex plane.*

(c) (30 points) Using what you found in parts (a) and (b), determine the real steady state current, I. By real, we mean the true current that could be measured (after waiting a long time).

(d) (15 points) If the function generator is tuned very low (very small ω), what happens to the steady state current? How does this response make sense?

(e) (20 points) We attach a set of leads across the resistor as shown and measured the voltage across it, V_{out}.



What is V_{out} in the steady state? What kind of a filter could this be? How do you know?

(f) (5 points (bonus)) If the function generator is tuned very high (very large ω), what happens to the steady state current?