

PHY2250 - HW 4 - "AC, & Cap Intro"

1. Signal A has an amplitude of 3V. Signal B has the same frequency as Signal A, but has an amplitude of 6V and a phase shift of 90 degrees relative to Signal A. Before he can apologize, "Timbaland" plugs both signals into a "Y" adaptor...
 - a. Considering the Signal A to be at 0 degrees (along the +x axis), draw the vectors, *i.e.* the "phasors," for both signals *and* their sum.
 - b. What is the phase difference between the summed signal and Signal A?
2. Walter Becker has a 25mF capacitor with a voltage of 9V applied across it (and left for a while). How much charge does it (eventually) store?
3. Tom Morello has a parallel plate capacitor with a plate area of 9 cm², a separation of 1 mm, and a dielectric constant of 1.5. What is its capacitance?
4. For a lab in PHY2010, Dr. Hawley bought four 0.1μF ceramic capacitors.
 - a. How many nF is 0.1μF?
 - b. If he wanted to make the total capacitance as large as possible, would he place the capacitors in series or parallel? What would this capacitance be?

FYI: The biography of the magnificent British physicist and devout "Sandemanian" Christian Michael Faraday (as in "Farads") is an entertaining tale. Check it out.