For the following problems, write "I" for "increase," "D" for "decrease," or "S" for "stays the same."

What happens to the current, I, in Fig. 1 when:

1. R is increased ____   2. C is increased ____ 3. V is increased ____
4. f is increased ____   5. V and R are doubled ____ 6. V, R, and f are doubled ____
7. V and R are halved, C doubled ____
8. As f becomes very large in the circuit of Fig. 1, the voltage across C approaches _______.
9. As f approaches 0 Hz, $V_C$ approaches a value of ____, and the current I approaches ________.

Suppose $V = 3$ VAC, $f = 1592$ Hz, $C = 0.1 \ \mu F$, and $R = 1000 \ \Omega$ in the circuit of Fig. 1. Find:

13. $V_{C-PK} = ______$  14. $I_{PK} = ______$  15. $V_C + V_R = ________ (= 3 \ \text{V}?)$
16. the phase angle by which the current leads/lags the applied voltage = ________.

17. Fig. 2 graphs the instantaneous applied voltage, $v_T$, vs. the time. On the same graph in Fig. 2, sketch in the graph of the instantaneous capacitor voltage, $v_C$, vs. time. (Note that the voltage scale is 2 V per vertical division.)
18. Now sketch the graph of the instantaneous current, $i$, in this circuit, using Fig. 3. (Note that the current scale is 1 mA per vertical division.)

19. Starting with the circuit values given for problems 10 - 18, to get a current of 1 mA, you could change $C$ to ________ µF.

20. Starting with the circuit values given for problems 10 - 18, to get a current of 1 mA, you could change $R$ to ________ Ω.

For the following problems, write "I," "D," or "S" as before.

In the circuit of Fig. 4, what happens to:

21. $I_C$ when $f$ decreases ____
22. $I_R$ when $V$ increases ____
23. $V_C$ when $f$ is doubled ____

24. For very low frequencies, $I_C$ in Fig. 4 approaches ________.

Suppose $I_C = 5$ mA, and $I_R = 12$ mA in the circuit of Fig. 4. Then

25. $I_T = ________.$

Find $I_T$ if the following changes are then (separately) made:

26. $f$ is doubled ________
27. $V$ and $C$ are doubled ________

28. $V$ and $R$ are doubled, $f$ is halved ________

If the branch currents are as stated for problem 25 above, $f = 1000$ Hz, and $R = 1000$ Ω, find:

29. $V = ________$
30. $X_C = ________$
31. $C = ________$
32. In a series RC circuit,
   A. the current leads the applied voltage by 90 degrees.
   B. the current lags behind the applied voltage.
   C. the voltage across the capacitor lags behind the current by 90 degrees.
   D. the voltage across the resistor is in phase with the current.

33. In a parallel RC circuit,
   A. the voltage across the capacitor lags behind the applied voltage.
   B. the applied voltage lags behind the capacitor’s current by 90 degrees.
   C. the resistor’s current is in phase with the applied voltage.
   D. the capacitor’s current lags behind the total line current.

The vector diagram below represents the currents in a parallel RC circuit.

34. Vector _____ represents the resistor current.

35. Vector _____ represents the capacitor current.

36. Vector _____ represents the total line current.