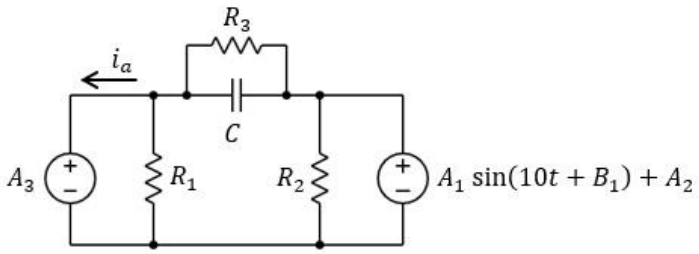
Q1

Find steady state current $i_a(t)$.



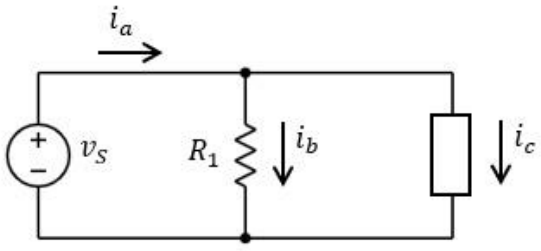
R1: 3 Ω
R2: 2 Ω
R3: 2 Ω
C: 50 mF
A1: 2 V
B1: -20 degrees
A2: 3 V
A3: 3 V

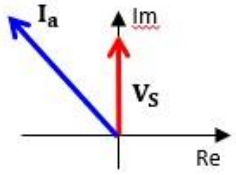
Q2

The AC circuit below has ω = 10 rad/s and is in steady state. The phasor diagram shows the phasors of v_S and i_a. You are given $|\mathbf{I_a}|$ and $|\mathbf{V_S}|$. The diagram is not necessarily drawn to scale (but V_S is along the imaginary axis and I_a is in the quadrant it is depicted).
The element on right (rectangular box) is either an inductor or a capacitor but you are not told which.

(a) At what time t_0 does the waveform of i_b reach its maximum value? (if there are multiple such times, giving one of them is sufficient).

(b) What is the mystery element (capacitor or inductor) and what is its value?





|Ia|: 5 A
|Vs|: 8 V
R1: 2 Ω