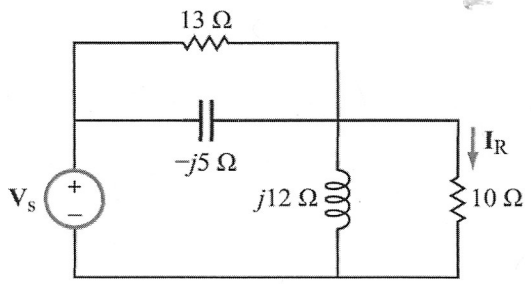
Solution

EE101 Quiz 9, March 12, 2019

Name_____ Student ID Number_____

Consider the following phasor domain circuit.



Part A (2 points) Find a phasor representation for v_s = 25 sin ωt.

(Answer) $\boldsymbol{V}_s$ = $25 e^{-j90^\circ} = -j25$

$v_s = 25 \sin \omega t = 25 \cos(\omega t - 90^\circ)$

$V_s = 25 e^{-j90^\circ} = -j25$

Part B (5 points) Find I_R

(Answer) I_R = _____

Show your detailed calculations.

$Z = \dfrac{13(-j5)}{13-j5} + \dfrac{\frac{5}{6}(j12)}{\frac{10}{5}+j12}$

$= \dfrac{-j65(5+j6) + j60(13-j5)}{(13-j5)(5+j6)}$

$= \dfrac{690 + j455}{(13-j5)(5+j6)}$

$I_R = I_s \dfrac{j12}{10+j12}$

$= -j25 \dfrac{(13-j5)(5+j6)}{690+j455} \dfrac{j6}{(5+j6)}$

$= 150 \dfrac{13-j5}{690+j455} = 150 \dfrac{13.93 e^{-j21^\circ}}{826.5 e^{j33.4^\circ}}$

$= 2.53 e^{-j54.3^\circ}$

$I_s = V_s / Z = -j25 \dfrac{(13-j5)(5+j6)}{690+j455}$

Part C (3 points) Express i_R(t) as A sin (ωt + Θ)

(Answer) $i_R(t) = 2.53 \cos(\omega t - 54.3^\circ) = 2.53 \sin(\omega t - 54.3^\circ + 90^\circ)$

$= 2.53 \sin(\omega t + 35.7^\circ)$ ans