Complex numbers 002

Problem has been graded.

Find A_1 and B_1.

$$\mathbf{V_1} = b\sqrt{2} \cdot j \qquad \mathbf{Z_1} = \left(aj + \frac{a}{1+j}\right)^{-1} \qquad \mathbf{I_1} = \frac{\mathbf{V_1}}{\mathbf{Z_1}}$$

$$\mathbf{I_1} = A_1 \cdot e^{jB_1} \quad \text{with} \quad 0 \leq A_1 \quad \text{and} \quad -180° \leq B_1 \leq 180$$

Solve without a calculator

Given Variables:

a : 1 .

b : 2 .

Calculate the following:

A1 (.) :

2 ✓

B1 (degrees) :

135 ✓

> Hint: Write Z1 in polar coordinates.

Find A_1 and B_1.

a : 2 .

b : 2 .

$$\mathbf{V_1} = b\sqrt{2}\cdot j \qquad \mathbf{Z_1} = \left(aj + \frac{a}{1+j}\right)^{-1} \qquad \mathbf{I_1} = \frac{\mathbf{V_1}}{\mathbf{Z_1}}$$

$\mathbf{I_1} = A_1 \cdot e^{jB_1}$ with $0 \le A_1$ and $-180^\circ \le B_1 \le 180$

$$I_1 = \left(2\sqrt{2}\,j\right) \cdot Z^{-1}$$

$$= \left(2\sqrt{2}\,j\right)\left(2j + \frac{2}{1+j}\right)$$

$$= 4\sqrt{2}\,j\left(\frac{j-1+1}{1+j}\right)$$

$$= \frac{-4\sqrt{2}}{1+j}$$

$$= \frac{4\sqrt{2}\,e^{j\pi}}{\frac{2}{\sqrt{2}}\,e^{j\pi/4}}$$

$$= 4\,e^{j\frac{3\pi}{4}}$$

$$\boxed{A_1 = 4}$$

$$\boxed{B_1 = 135^\circ}$$