Quiz # 10

EEL 3111C                Spring 2012                Dr. Srivastava

SrivaStAva                ____________________________                _______________________
Last Name                First Name                Section #

Find anyone of the following quantities in the circuit shown. You need not find each one.

(a) Thevenin's voltage phasor at A and B,

or (b) Norton's current phasor at A to B,

or (c) Thevenin's impedance at A and B.

\[ V_{AB} \]

Let \( \tilde{V}_{tn} = \tilde{V}_{AB} \)

\[ I_1 = 2 \angle 45^\circ \] \hspace{1cm} (1)

\[ I_x = \tilde{I}_1 - \tilde{I}_2 \] \hspace{1cm} (2)

\[ 2\angle 0^\circ (\tilde{I}_2 - \tilde{I}_1) + 110\angle 0^\circ \tilde{I}_2 + 10\angle 0^\circ \tilde{I}_x = 0 \] \hspace{1cm} (3)

\[ -10 \tilde{I}_x + (10 - 10) \tilde{I}_3 = 0 \]

Solution gives \( \tilde{I}_2 = 1 \angle 135^\circ, \tilde{I}_3 = \sqrt{2} \angle 45^\circ \).

\[ \tilde{V}_{tn} = -110 \angle (\tilde{I}_3) = 10 \angle 45^\circ \ V \]

Let \( \tilde{I}_n = \text{Short-Circuit Current from A to B} \).

For Node 3: \( -10 \tilde{I}_x + 10 \tilde{I}_3 = 0 \)

\[ \tilde{I}_3 = \tilde{I}_x = \tilde{I}_1 - \tilde{I}_2 \]

\[ \tilde{I}_3 = \sqrt{2} \angle 45^\circ \]

\[ \tilde{I}_n = \tilde{I}_3 = \sqrt{2} \angle 90^\circ \ A \]

\[ \frac{\tilde{V}_{tn}}{\tilde{I}_n} = \frac{10 \angle 45^\circ}{\sqrt{2} \angle 90^\circ} = 5 \sqrt{2} \angle 45^\circ \ A \]

\[ \frac{\tilde{V}_{tn}}{\tilde{I}_n} = (5 - \sqrt{2}) \Omega \]