**Chapter 9, Solution 15.**

(a) $\begin{vmatrix} 10 + j6 & 2 - j3 \\ -5 & -1 + j \end{vmatrix} = -10 - j6 + j10 - 6 + 10 - j15$

$= \mathbf{-6 - j11}$

(b) $\begin{vmatrix} 20\angle -30^\circ & -4\angle -10^\circ \\ 16\angle 0^\circ & 3\angle 45^\circ \end{vmatrix} = 60\angle 15^\circ + 64\angle -10^\circ$

$= 57.96 + j15.529 + 63.03 - j11.114$

$= \mathbf{120.99 + j4.415}$

**(c)**

$$\begin{vmatrix} 1-j & -j & 0 \\ j & 1 & -j \\ 1 & j & 1+j \\ 1-j & -j & 0 \\ j & 1 & -j \end{vmatrix}$$

$= (1-j)1(1+j) + j^2 0 + 1(-j)(-j) - 0(1) - (1-j)(-j)j - j(-j)(1+j)$

$= 2 - 1 - 1 + j - 1 - j = \mathbf{-1}$