Concept Question 7-4: When is a discrete sinusoid not periodic?
Almost always. The discrete-time sinusoid $A \cos (\Omega n+\theta)$ is not periodic unless $2 \pi / \Omega$ is a rational number $N / k$, in which case $N$ is the period if $N / k$ has been reduced to lowest terms. See Eq. (7.21).

