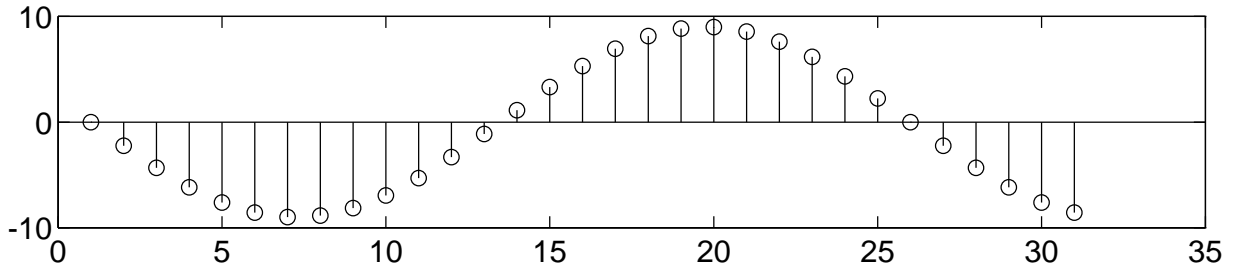




## PROBLEM:

Suppose that MATLAB is used to plot a sinusoidal signal. The following MATLAB code generates a signal  $x[n]$  and plots it. Unfortunately the plot does not have its time axis labelled properly.

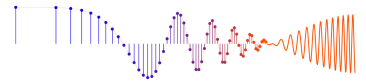
```
dt = 0.01;
Duration = 0.3;
tt = 0 : dt : Duration;
Fo = 396;
xx = 9*cos( 2*pi*Fo*tt - pi/2 );
subplot(3,1,1)
stem( xx ) %<--- OOPS! there is no time axis
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(a) For the plot above, determine the correct formula for the discrete-time signal in the form:

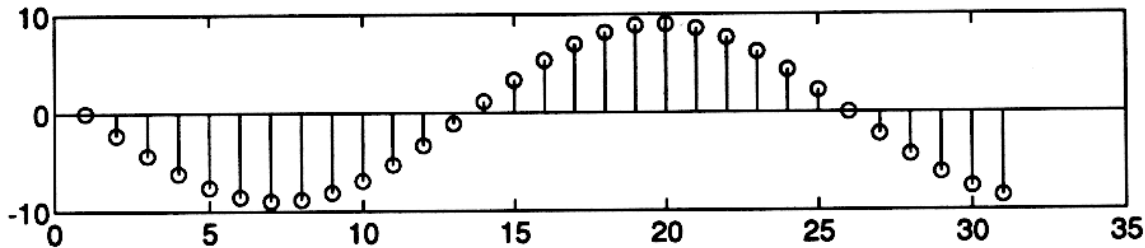
$$x[n] = A \cos(\hat{\omega}n + \phi)$$

(b) EXPLAIN how aliasing affects the plot that you see.



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(a) For the plot above, determine the correct formula for the discrete-time signal in the form:

$$x[n] = A \cos(\hat{\omega}n + \phi)$$

$$\begin{aligned} x[n] &= 9 \cos\left(2\pi(396)\frac{n}{100} - \frac{\pi}{2}\right) \\ &= 9 \cos\left(2\pi\left(\frac{-4}{100}\right)n - \frac{\pi}{2}\right) \\ &= 9 \cos\left(2\pi(0.04)n + \frac{\pi}{2}\right) \end{aligned}$$

(b) EXPLAIN how aliasing affects the plot that you see.

Plot is Low frequency with period = 25 samples  
 with  $dt = \frac{1}{100}$  sec., the period is  $\frac{1}{4}$  sec  
 so the signal appears to have a  
 frequency = 4 Hz.