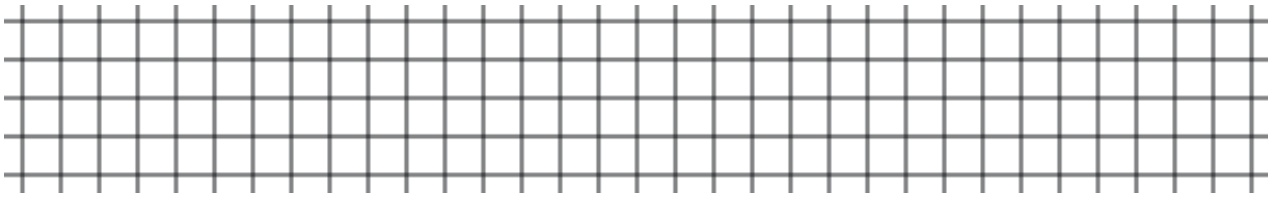
EE 16B Designing Information Devices and Systems II
Fall 2015 Section 6B

1. Sampling Cosines

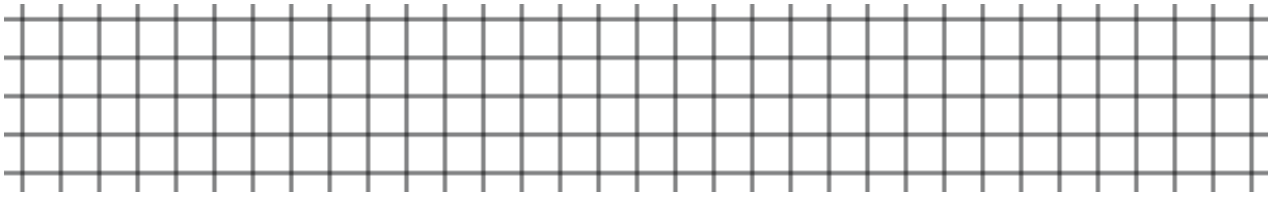
In this problem, we will examine the effects of sampling the function $x(t) = \cos(\frac{2\pi}{4}t)$.

(a) What is the period of this function? What is the frequency in Hz? In radians?

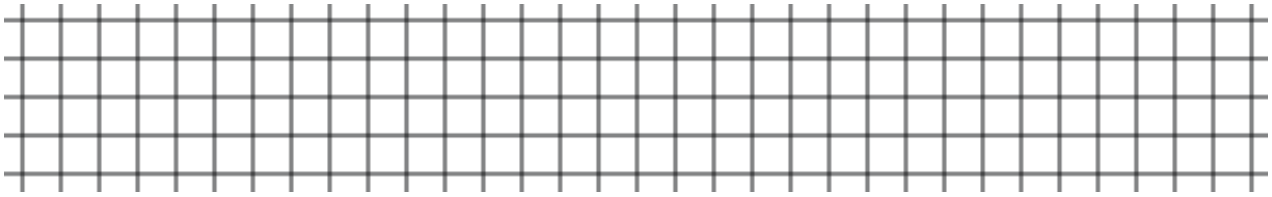
(b) Plot the function below. Space out your graph so that several periods of the sinusoid are visible.



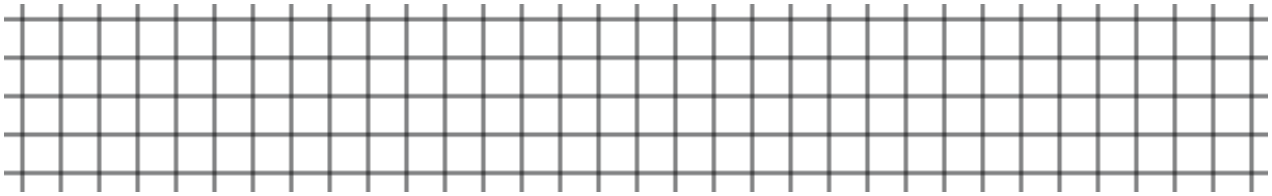
(c) Now "sample" the function with $T_s = 1$. Mark the sampled points on the plot above, then make a separate lollipop diagram on the plot below consisting of only the sampled points. (Use the same axes as in the previous plot.)



(d) Repeat the sampling with $T_s = 4$ and plot the sampled points below. What does the plot look like?



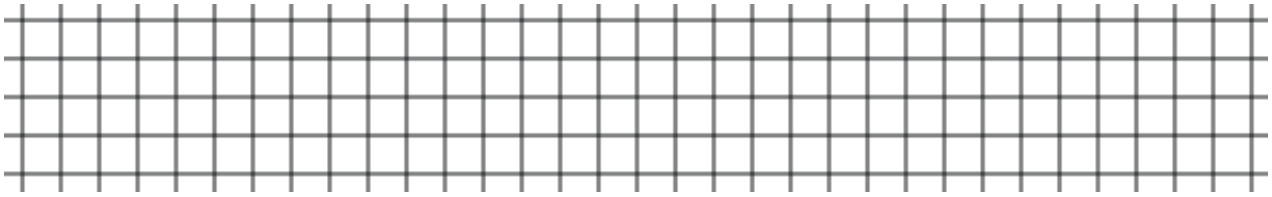
(e) Finally, sample the function with $T_s = 3$ and plot the sampled plots below. What function "appears" in the sampled points? (That is, what is the "most obvious" sinusoid that can be drawn from your plot?) Write the equation $x_3(t)$ for the sinusoid that appears.



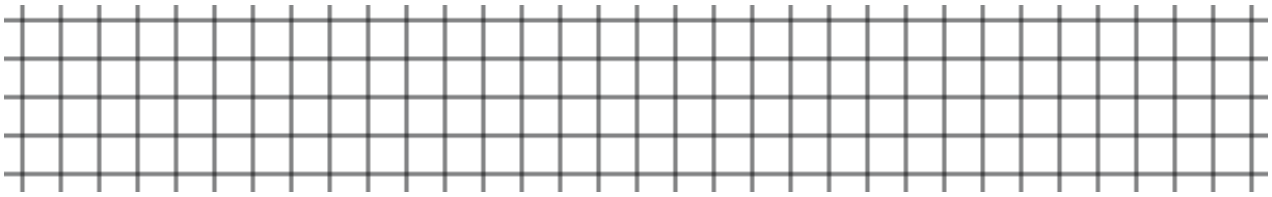
2. Sampling Sines

Now let's take a look at $y(t) = \sin\left(\frac{2\pi}{4}t\right)$.

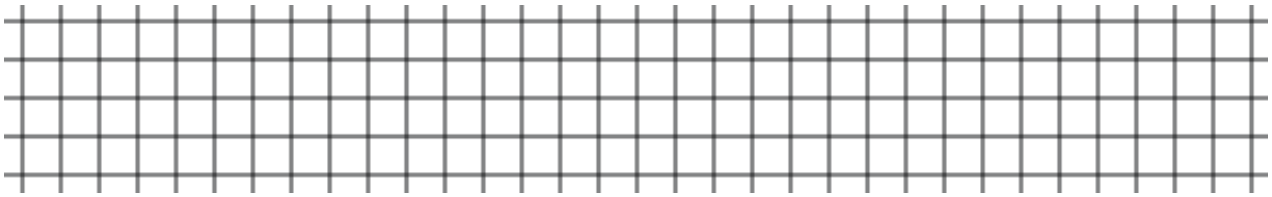
(a) Plot the function below. Space out your graph so that several periods of the sinusoid are visible.



(b) Now "sample" the function with $T_s = 1$.



(c) Repeat the sampling with $T_s = 4$ and plot the sampled points below. What does the plot look like?



(d) Finally, sample the function with $T_s = 3$ and plot the sampled plots below. What function "appears" in the sampled points? Write the equation $y_3(t)$ for the sinusoid that appears.