1. For each discrete-time (DT) signal below, do the following:
   i. Sketch \( x(n) \) by hand, i.e. don’t use Matlab.
   ii. Calculate its energy, i.e. \( \sum_{n=-\infty}^{\infty} \{|x(n)|^2\} \).
      
      a. \( x(n) = 2^n u(-n-1) \)
      b. \( x(n) = \sum_{k=-\infty}^{\infty} \cos(\pi(n-6k)/6)\{u(n-6k) - u(n-6k+3)\} \)
         (As usual, \( u(n) \) denotes the discrete-time unit step signal.)

2. This exercise illustrates an important property of DT sinusoids:
   \[
   \cos(\omega n + \varphi) = \cos((\omega + 2\pi)n + \varphi),
   \]
i.e., increasing the frequency by \( 2\pi \) does not change the sinusoid.

   In MATLAB, plot the continuous-time (CT) signal
   \[
   \cos\left(\frac{\pi}{4}t\right), \quad \text{for} \quad 0 \leq t \leq 10.
   \]
   Using the MATLAB command:
   
   >> hold on

   plot the CT signal
   \[
   \cos\left(\frac{\pi}{4} + 2\pi\right) t, \quad \text{for} \quad 0 \leq t \leq 10,
   \]
on the same plot—that is, do not use subplot. For the second signal, use a different line type and/or a different color. To find out about line types and colors, say

   >> help plot

   (Hint. It is impossible to really plot a CT signal in MATLAB; however, if you use many points, the signals will look on the screen as though they are CT signals. The following command:

   >> t = 0:0.01:10;

   will generate a 1001-point vector \( t \), whose entries are all integer multiples of 0.01
from 0 to 10. Use this vector to plot both sinusoids.)

On the same plot, display the sampling of the first sinusoid at integer points, i.e., the following DT signal:

$$\cos\left(\frac{\pi}{4}n\right) \text{ for } n = 0, 1, \ldots, 10.$$ 

Use MATLAB’s stem command; use a different line color. Observe that the sampling of the first CT sinusoid at integer points is the same as the sampling of the second one:

$$\cos\left(\frac{\pi}{4}n\right) = \cos\left(\frac{\pi}{4} + 2\pi n\right)$$

The second CT sinusoid oscillates faster, but the sampling points do not “see” that.

Your write-up should include a printout of the MATLAB plot of the three signals. You do not have to have a color printout. Make sure that the horizontal axis is labeled correctly. Also include the commands you used to generate the plot.