Project 1

1. compute the signal $y = \sin^3(4t)$ and add uniform noise using $z = 0.3 \cdot \text{rand}(1, 200)$. plot $y$ and $y+z$.

2. Unit step function MATLAB’s inline function is convenient for creating the unit step function $u(t)$ or $u(n)$. Try:

   ```matlab
   u = inline('t >= 0');
   t = linspace(-2, 10, 100);
   plot(t, u(t-3) + u(t-5))
   ```

3. use the matlab function `roots` to compute the zeros of $x^{10} + x - 2$.

4. find the square root of 2 using Newton’s method.

   ```matlab
   x1=10;
   for k=1:10
     x2=x1-f(x1)/f'(x1);
     x1=x2;
   end
   ```

   Here $f(x) = x^2 - 2$. Use the same method to find the roots of the equation $\tan(x) = x$.

5. Sound: On machines that have sound cards, MATLAB can use the sound command to send discrete-time signals to those cards to be converted to analog audio signals, which can be heard using headphones. Here is an example that generates a 1kHz sinusoidal signal of 0.5 second duration at a 8192Hz sampling rate.

   ```matlab
   fs = 8192;
   f = 1000;
   n = 1:(0.5*fs);
   x = sin(2*pi*f*n/fs);
   sound(x, fs)
   ```