Math 3890, Machine Problem 4: Due Tu., 2/16/21

1) Write a function `c = lsqsplo(d,y,t,z)` which finds the coefficient vector for the spline s of degree d with extended knot vector y which fits given data $z_1, \ldots, z_N$ obtained by sampling a function f at points $t_1 < t_2 < \cdots < t_N$. Your code should be based on solving the observation equations directly.

2) Write a script to use your function to fit some data. The script should
   a) define an anonymous function f for testing
   b) define the interval of interest $[a, b]$
   c) input N, ε,d, and k
   d) sets up the extended knot sequence for a spline of degree d with k equally spaced knots in the interval (a, b)
   e) sets $z_i = f(t_i) + \varepsilon w_i$, for $i = 1, \ldots, N$ with N equally spaced $t's$ in $[a, b]$
   f) call your function `lsqsplo` to compute the coefficient vector
   g) compute the max norm of $f - s$ on 501 equally-spaced points in the interval $[a, b]$.
   h) plot both f and s on the same figure using the 501 sample points

2) Run your script with $f = exp(t)\sin(2\pi t)$, $N = 201$, $d = 3$, $\varepsilon = 0$, and $k = 15$. Turn in the code and figure.

3) Repeat 2) with $\varepsilon = .2$.