Math 3890, Machine Problem 10: Due Tu., 3/30/21

1) Write a function `c = scat0d(d,x,y,z,v1,v2,v3,e1,e2,e3,ie1,ie2)` that finds a C^0 spline of s degree d that interpolates scattered data where (x, y) are the sample points and z contains the values to be interpolated. The spline should be defined on the triangulation described by `x,y,v1,...,ie2`. For each triangle T
   a) set the coefficients associated with the three vertices to the data values (this insures interpolation)
   b) find the m vertex points closest to the barycenter of T. Drop the first three of these (they will be the vertices of T.
   c) write observation equations for each of these remaining points and solve them by least-squares to get the coefficients of the spline corresponding to the domain points of T minus the 3 vertices.

   You may use my functions `getindex`, `bcoord` and `basisv`.

2) You should choose $m = 3n_d$, where n_d is the dimension of the space of polynomials of degree d. Use `knnsearch` to find the m points for each triangle. Note that to speed up your code, you can do all triangles at once with a single call of this function.

3) Write a script to test your function. It should
   a) call `readtri` to read a triangulation from a file
   b) set z = f(x,y), where f is Franke's funtion
   c) Prompt for d and use `scat0d` to compute the coefficients.
   d) Use `valspgrid` to find the values of the spline on a 71×71 grid covering the triangulation.
   e) Use these values to plot the spline and compute max and RMS errors.

4) Run your script for $d = 3$ with type-2 triangulations with 81 and with 289 vertices. Report the errors and submit the plots.

5) Repeat your tests with $d = 5$.