Math 3890, Machine Problem 8: Due Tu., 3/16/21

1) Write a function `c = intDP1(d,x,y,v1,v2,v3,e1,e2,e3,ie1,ie2,f,E,lambda)` that finds the coefficient vector of the spline $s \in \mathcal{S}_d^0(\triangle)$ that fits the function f using data at all of the domain points associated with the triangulation $\triangle$. The function should use a penalty based on the smoothness conditions to force s to be closer to C^1. Here `E` is the matrix describing the C^1 smoothness, and lambda is a parameter to balance goodness of fit how well the smoothness conditions are satisfied.
   a) Your function should set up observation equations, then add the equations lambda E = 0. conditions.
   b) Solve these equations by least-squares. The coefficient vector should be numbered as expained in Sect. 4.9. You can use my functions `domT`, `basisv`, and `getindex`.

2) Write a script to test your function. It should
   a) call `readtri` to read a triangulation from a file
   b) call `trilists` to set up the corresponding lists
   c) prompt for `d` and lambda.
   d) call `intDP1` to compute coefficients
   e) use `valspgrid` to evaluate the spline on a 51×51 grid covering the domain.
   f) Use the output to plot the spline and to compute and print max and RMS errors over the grid points. You can use `errg`.

3) Run your script with $d = 5$ and `lambda = .1` for the Franke function and the triangulation corresponding to the data file `type2.25`. Report the computation time, max and RMS errors, and the value of `c1ck`.

4) Repeat for the triangulations `type2.81` and `type2.289`.