

Math 3890, Machine Problem 6: Due Tu., 3/2/21

- 1) Write a function `[v1,v2,v3,e1,e2,e3,ie1,ie2,area] = mylists(x,y,TRI)` which inputs  $n$ -vectors  $x, y$  and a  $n_t \times 3$  matrix `TRI` defining a triangulation in the plane. The function should do the following:
  - a) find vectors `v1`, `v2`, `v3` of length  $n_t$  such that  $v1(i), v2(i), v3(i)$  are the vertices of the  $i$ -th triangle (in counter-clockwise order).
  - b) find vectors `ie1`, `ie2` describing the edges of the triangulation such that for each  $i$ ,  $ie1(i) < ie2(i)$  and  $(ie1(i), ie2(i))$  describes the  $i$ -th edge.
  - c) find vectors `e1`, `e2`, `e3` such that for the  $i$ -th triangle,  $e1(i), e2(i), e3(i)$  give the indices of the edges of that triangle (in counterclockwise order), where the first edge starts at the first vertex of the triangle.
  - d) compute a vector called `area` that contains the areas of the triangles in your list.
- 2) Write a script to test your function. It should
  - a) prompt for a file name and use `readtri` to read  $n$ ,  $x$ ,  $y$ , and a matrix `TRI` describing a triangulation.
  - b) plot the triangulation
  - c) call on your function to create lists
  - d) print a table of your output (cf. Example 3.2 of the book)
  - e) label the vertices, edges, and triangles on your plot
- 3) Run your script for the data file `tri8.dat`. Submit your program listings, the table, and the figure. NOTE – your lists may differ from what is in the book, depending on how you compute them.