Math 181 F1 Quiz 9 Name:

Two pages, 4 problems, 10 points. Show all work. No calculators.

Problem 1 (2 points). *Answer without shading the picture, and make sure to explain your answer using numbers.*

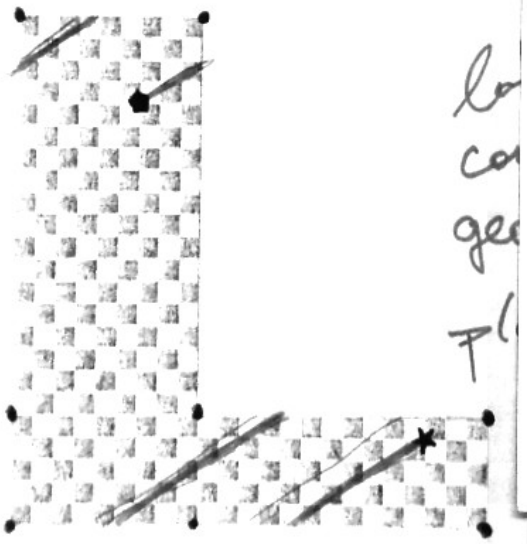
(a) Is the star inside or outside the loop? Why?

4 ⇒ even ⇒ outside

(b) Is the pentagon inside or outside the loop? Why?

3 ⇒ odd ⇒ inside

Problem 2 (2 points). *Suppose we glue opposite sides in the following picture. Draw a geodesic between the pentagon and star.*



Problem 3 (4 points). *Suppose you have a surface that has 4 vertices, 4 faces, and 6 edges.*

(a) Find the Euler characteristic of the surface.

2

(b) Find the genus of the surface.

0

(c) Draw the surface in 3D just based on information about its genus (don't show the vertices, faces, and edges).

(d) Draw the same surface in 3D in a way that shows the vertices, faces, and edges - and with flat faces. Hint: it should be a very familiar shape.

Problem 4 (2 points). *Suppose I glue the left and right sides of the chessboard with a twist, so that the bottom left corner is glued to the* top *right corner. Shade in all the points that the black bishop can get to in one move.*