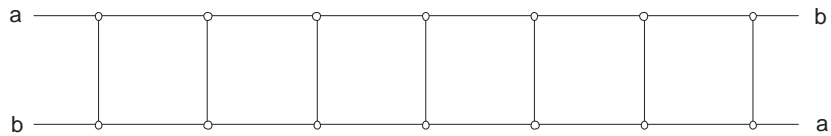


MATH 820 / Spring 2006
Topological Graph Theory
Final exam – Part 1
April 5, 2006

1. Determine the genus and the nonorientable genus of the graph obtained from the $2 \times n$ grid ($n > 1$) by adding two edges a and b as shown below for the value of $n = 7$.



2. A graph is said to be outerplanar if it can be drawn in the plane such that all its vertices lie on the boundary of the infinite face. Prove that every outerplanar graph of order n has at most $2n - 3$ edges.

3. Let G be the embedded graph shown in figure below, where the left and right side are identified, and the top and the bottom are identified after performing a shift as indicated in the figure. Make your best guess what are the edge-width and the face-width of this embedding, and then try to prove that your guess is correct.

