# More about Example 2 on page 362 of Munkres

The deformation retraction described in the lectures is not quite the same as the map described in Munkres, and the diagram below reflects the approach in the lectures. As in Munkres, we shall not attempt to derive explicit formulas, but the basic idea is as follows: First we show that the doubly punctured plane has a strong deformation retract given by the vertical strip in the second drawing of the first line. Geometrically, one collapses the complement to the boundary of the vertical strip to the boundary along horizontal lines. Then we show that the doubly punctured vertical strip has a strong deformation retract given by the union of two punctured disks which meet at a point on the boundary. This is done by collapsing along vertical lines. Finally, we show that the union of the union of the boundary circles, which is a Figure 8, is a strong deformation retract of the subset obtained at the previous step. This is done by pushing out radially from the centers of the disks out to their boundaries.