

**Math 131 - Problem Set 10**  
**Due Tuesday, Nov 27**

From Munkres: 58.2, 59.4, 60.5, 79.1, 79.2, 79.4

1. Let  $X$  be the figure eight space, with base point  $x_0$  where the two circles are glued. Let  $a$  and  $b$  be the two free generators of  $\pi_1(X, x_0)$ .
  - (a) What are the connected degree two coverings of  $X$  up to equivalence? Draw them! Make sure to label and orient the edges like we did in class.
  - (b) For each covering that you drew in (a), give a list generators for the corresponding subgroup of  $\pi_1(X, x_0)$ .
2. (Just for fun – not to be graded) Do the same as in problem 1 for the degree 3 coverings of  $X$ .