

Math Department Student Presentations

Noah Poirson (Linear Algebra)

Amelia Haas & Joanie Haas (Visual Mathematics)

Wednesday, 26 March 2014**4:00pm-4:30pm in S201**

If you are interested in doing independent research next year or would like to see a preview of what we do in some of our elective courses, **we invite you to attend!**

(also, since Amelia & Joanie are presenting on Knot Theory, which is a branch of Topology, you get bonus points for going!)

Comments on 1.2 HW:

Given $f: A \rightarrow B$, $A_0 \subseteq A$, $B_0 \subseteq B$,
we can make the following assumptions
(by definition of image/preimage):

$$x \in A_0 \Rightarrow f(x) \in f(A_0)$$

$$y \in B_0 \Rightarrow f^{-1}(y) \in f^{-1}(B_0)$$

$$x \in f^{-1}(B_0) \Rightarrow f(x) \in B_0$$

$$y \in f(A_0) \Rightarrow f^{-1}(y) \in A_0$$

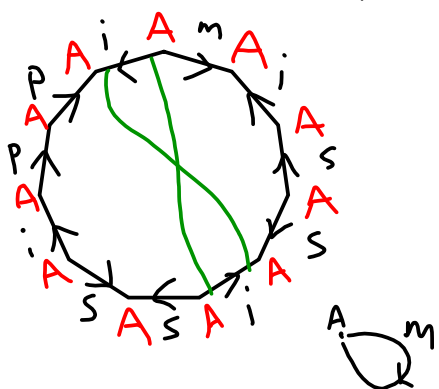
We can NOT assume that:

$$f^{-1}(f(x)) = x$$

$$f(f^{-1}(y)) = y$$

UNLESS f is a bijection.

$m i^{-1} s^{-1} s i^{-1} s s i p p i^{-1}$



$$F=1$$

$$E=4$$

$$V=1$$

$$\chi(s) = 1 - 4 + 1 = -2$$

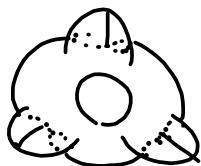
$$\chi(s) = 2 - g - b$$

$$-2 = 2 - g - 1$$

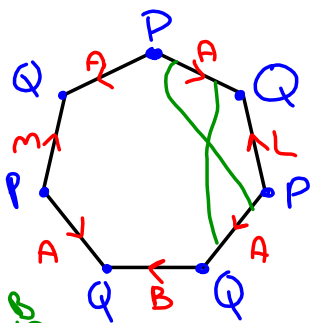
$$g = 3$$

Non-orientable with 1 boundary
and genus 3

Sphere with 3 crosscaps and 1 hole



$A L' A B A' M A'$



$$F=1$$

$$E=4$$

$$V=2$$

$$\chi(s) = 2 - 4 + 1 = -1$$

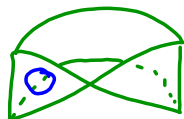
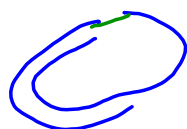
$$\chi(s) = 2 - g - b$$

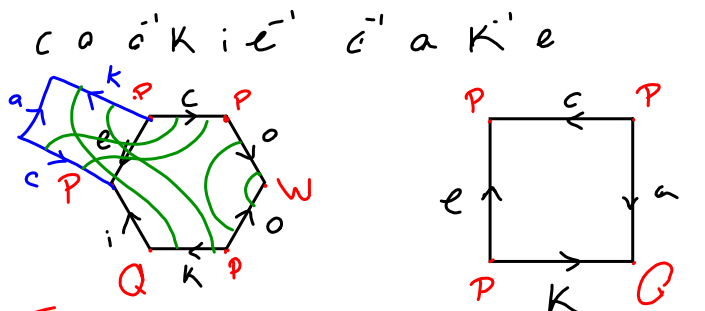
$$-1 = 2 - g - 1$$



Sphere with 1 crosscap & 2 boundary components $g = 2$

Möbius band
w/a hole





$F: 2$
 $E: 6$
 $V: 3$

$\chi(S) = 3 - 6 + 2 = -1$

orientable

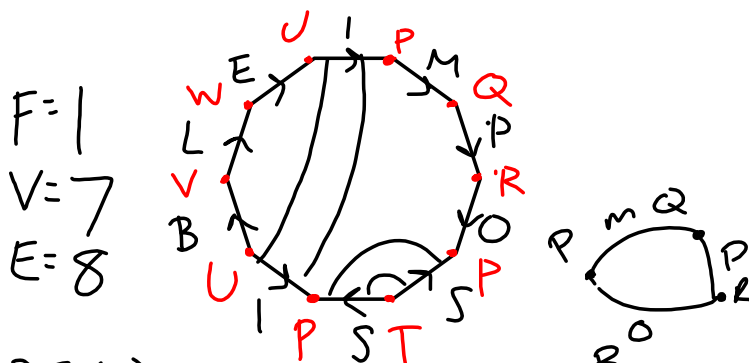
$\chi(S) = 2 - 2g - b$

$-1 = 2 - 2g - 1$

$g = 1$

sphere w/ 1 handle and 1 hole

IMPOSSIBLE



$\chi(S) = 7 - 8 + 1 = 0$

$\chi(S) = 2 - 2g - b$

$0 = 2 - 2g - 2$

$g = 0$

sphere w/ 2 holes

