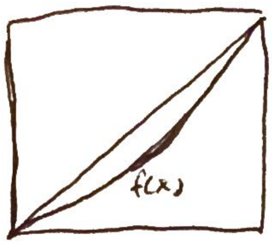
4. True, if f is orientation preserving then $h = -f$ is orientation reversing, as is $g(x) = -x$. Since $f = g \circ h$, f is a product of 2 orientation reversing homeo's.

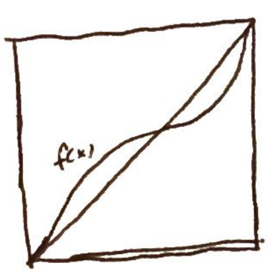
5. If $f: S^1 \to S^1$ has rotation # 0 then

f must have between 1 and ∞ fixed pts.

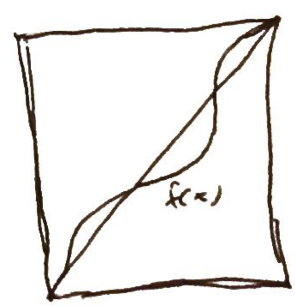
ex: • $f(x) = x$ has ∞'ly many fixed pts.

• 

has 1 fixed pt. (or $x \mapsto x+1$ on $\mathbb{R} \cup \{\infty\}$)

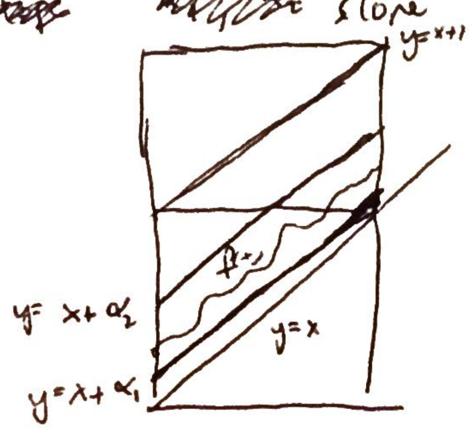
• 

2-fixed pts

• 

3-fixed pts.... etc...

To see why f with rotation # 0 cannot have 0-fixed pts I argue by contradiction. The graph of f in this case (f has 0-fixed pts.) must be bdd. between 2-lines of ~~slope~~ ~~...~~ slope 1 w/ rotation $\alpha_1, \alpha_2 \in (0,1)$



by the Squeeze thm we then have

$\rho(f) \in (\alpha_1, \alpha_2)$. In particular

$\rho(f) \neq 0$ mod 1.