

A) Continue argument to sketch  $G^3$ . How many fixed points of  $G^3$  must there be?

B) How many fixed points of  $G^3$  are accounted for by ...  
 period-1 orbits ?  
 period-2 orbits ?

[Hint: which lower periods give fixed pts of  $G^3$  ?]

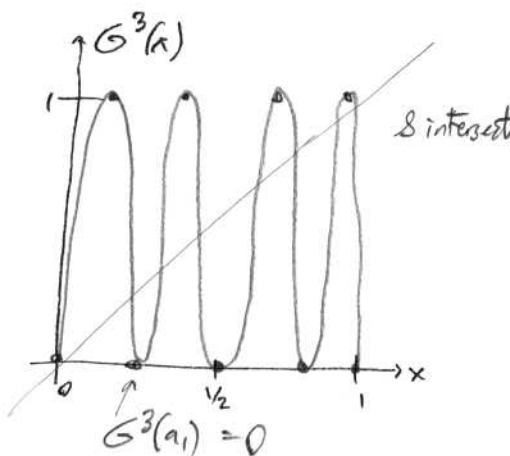
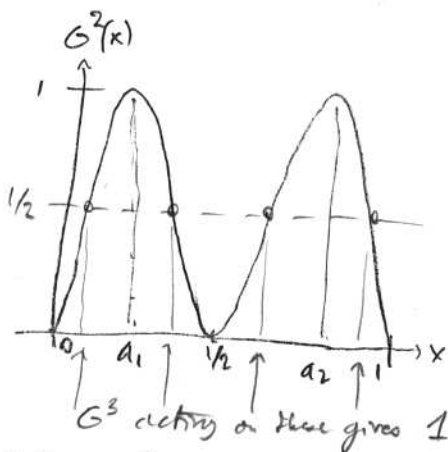
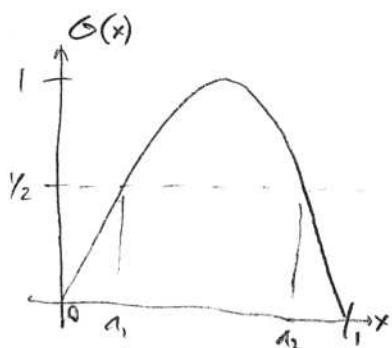
C) So, how many period-3 orbits are there?

D) How many fixed points of  $G^k$ ,  $k \geq 1$ , are there? (prove?)

E) Continue this 'periodic table':

period $k$	num. fixed pts of $G^k$	num. fixed pts. due to lower periodic orbits	num. orbits period $k$
1	2	0	2
2	4	2 period-1 orbits = 2	1
3			
4			
5			
6			
7			
...			

SOLUTIONS



A) Continue argument to sketch  $G^3$ . How many fixed points of  $G^3$  must there be? 8.

B) How many fixed points of  $G^3$  are accounted for by ...  
 period-1 orbits? 2  
 period-2 orbits? 0

[Hint: which lower periods give fixed pts of  $G^3$ ?]

since  $G^3(p_i) \neq p_i$  if  $\{p_1, p_2\}$  is period-2.  
 $p_1 \xrightarrow{G} p_2 \xrightarrow{G} p_1 \xrightarrow{G} p_2$   
 $\xrightarrow{G^3}$

C) So, how many period-3 orbits are there?  $8 - 2 = 6$  due to  $p-3 = 6$

D) How many fixed points of  $G^k$ ,  $k \geq 1$ , are there? (prove?)  $2^k$

E) Continue this 'periodic table':

period $k$	num. fixed pts of $G^k$	num. fixed pts. due to lower periodic orbits	num. orbits period $k$
1	2	0	2
2	4	2 period-1 orbits = 2	1
3	8	2	2
4	16	2 p-1 + 1 p-2 = 4	3
5	32	2	6
6	64	2 + 6 + 2 = 10	9
7	128	2	18
...		etc.	