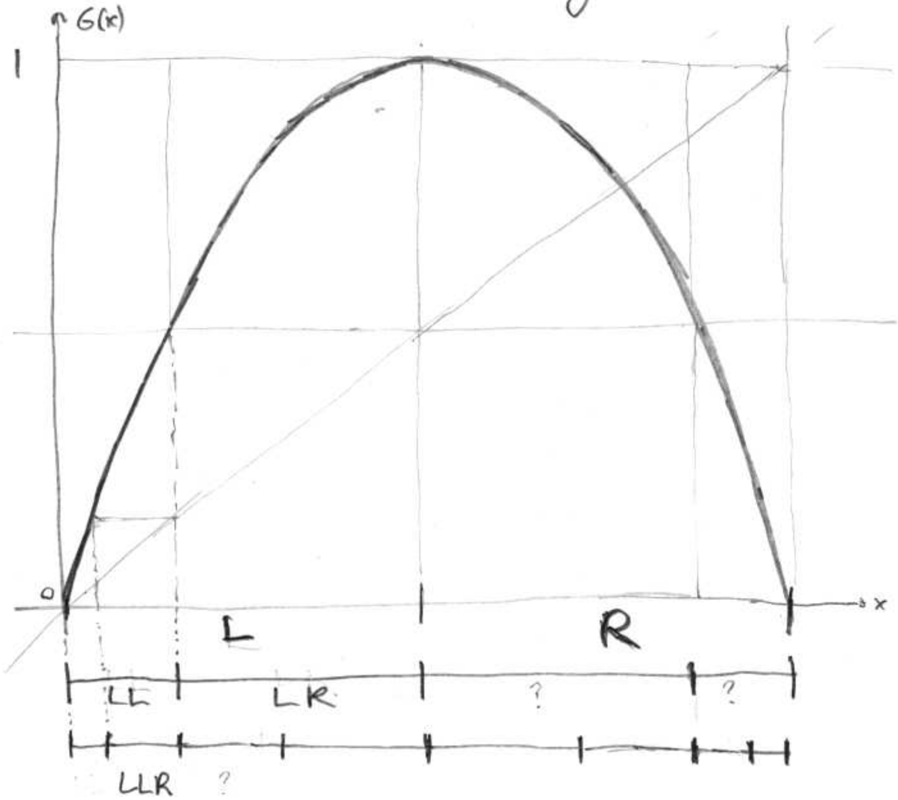
MATH 53 WORKSHEET : Itineraries

10/5/07
Barnett

a) Label all level-3 itinerary subintervals for $G(x) = 4x(1-x)$:



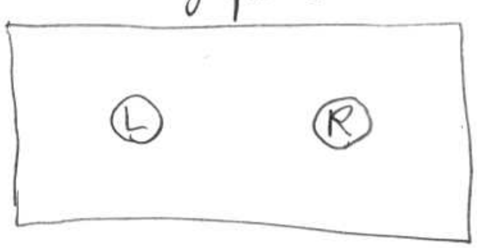
(first do level-2)

level 3.

b) What do predict the ordering for level-4 intervals is? (stop when bored)

Try to come up with a general rule.

c) Transition graph :



- draw an arrow from (L)→(R) in the box if it's possible to follow L by R in an itinerary.
- What does this imply about the sets $f(L)$ and R? (use $\cap, \cup, \subset, \supset$, etc)
- Add all other possible arrows to the graph.

d) Consider x_0 with itin. LRLLRRLR

Come up with an itin. subinterval which lies in LRLLRR but maps $\geq \frac{1}{4}$ from x_0 eventually (How many its required

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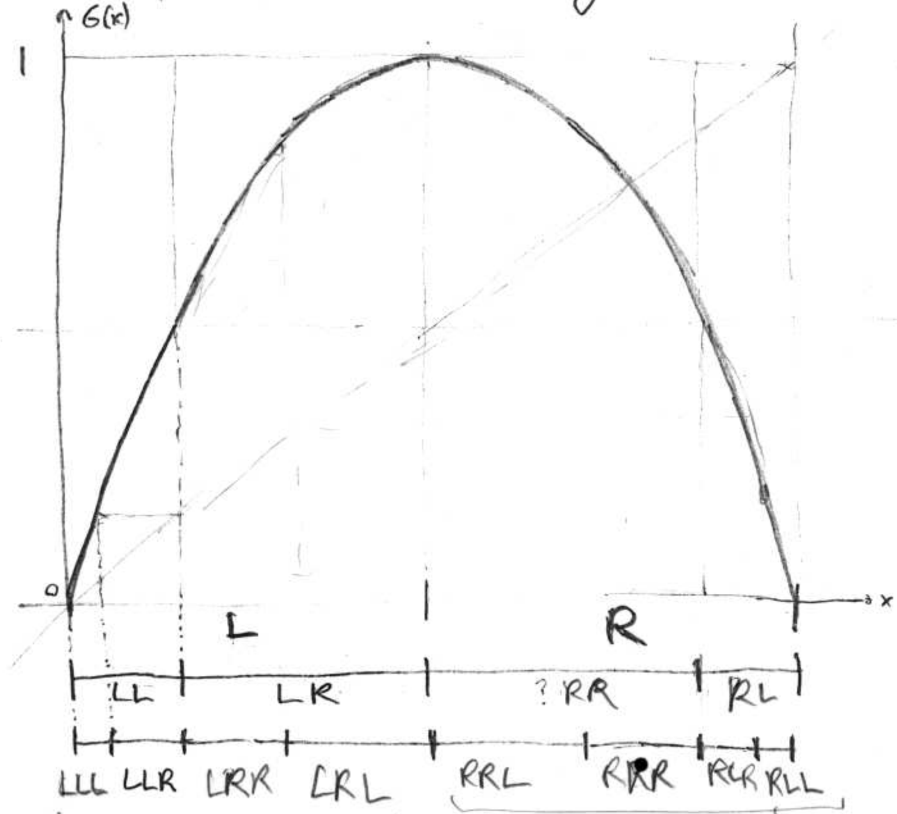
— SOLUTIONS —

a) Label all level-3 itinerary subintervals for $G(x) = 4x(1-x)$:



last letter always cycles: {L, R, R, L}

Also see book §1.8.

(first do level-2)

← level 3.

note when remove 1st letter, it's just the level-2 in same order

when remove 1st letter, it's level-2 in reverse order.

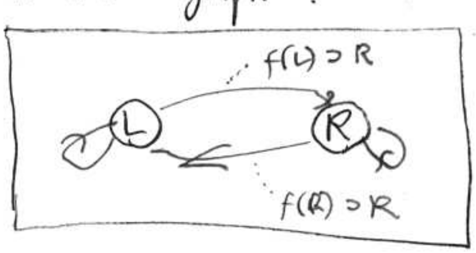
b) What do predict the ordering for level-4 intervals is? (stop when bored)

LLLL LLLR LLRR LLRL LRRL LRRR LRLR LRLL.

Try to come up with a general rule. RRLL RRLR RRRR RRRL RLRL RLRR RLLR RLLL.

see above: the key is that under G, a subinterval maps to its word with first letter removed.

c) Transition graph :



- draw an arrow from L → R in the box if it's possible to follow L by R in an itinerary.
- What does this imply about the sets $f(L)$ and R ? (use $\cap, \cup, \subset, \supset$, etc)

  $f(L) \underset{\text{encloses}}{\supset} R$.
- Add all other possible arrows to the graph. (4 total)

d) Consider x_0 with itin. LRLLRRLR → $y_0 \in$ LRLLRR RL (same.)

Come up with an itin. subinterval which lies in LRLLRR but maps $\geq \frac{1}{4}$ from x_0 eventually (after 6 its)
(How many its so required