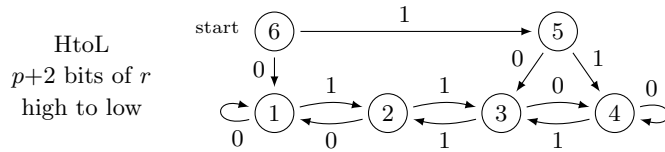


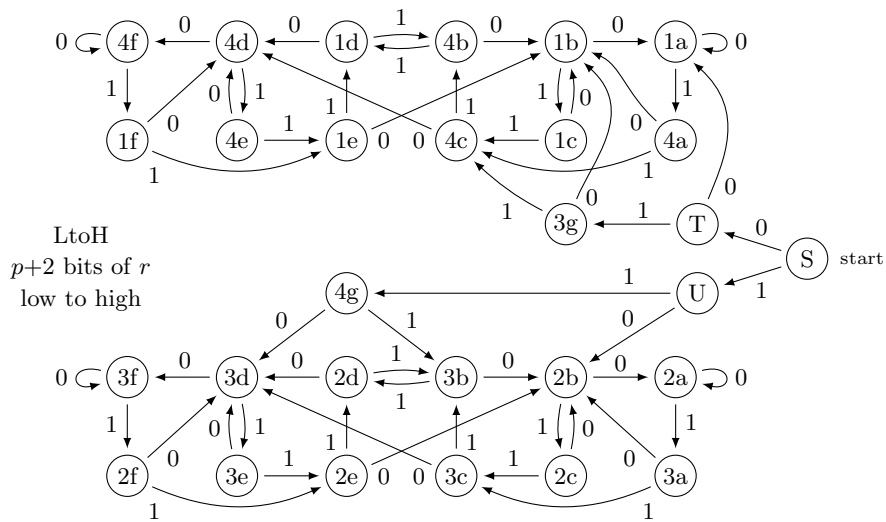
A073057 Append Morphism Diagrams

The code in `a073057-code.gp` uses two state machines. The easy one is



States 1 to 4 are the morphism with a 0 or 1 bit transition for the first or second term of its expansion respectively.

Reversing by some usual state machine manipulations gives LtoH which takes bits from least to most significant.



1,2,3,4 in each state is the result $a(n)$ ($= b(m)$). The letters distinguish various states with the same result. The upper and lower 6×2 rows are the same apart from results 1,4 versus 2,3.

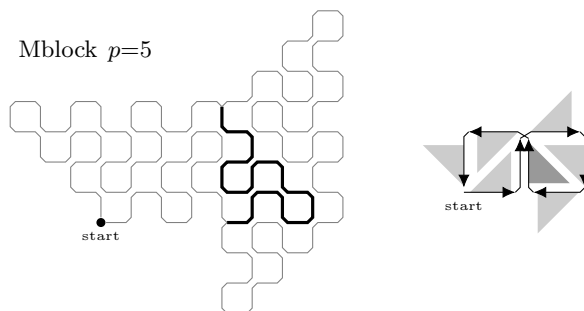
The start state is S for all $p+2$ bits of r , but the code instead takes the lowest two bits of r and starts in state 1a, 2b, 3g, 4g according as $r \equiv 0$ to 3 respectively. States S,T,U exist only to send the two low bits to these.

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<http://user42.tuxfamily.org/seq-A073057-append-morphism/index.html>

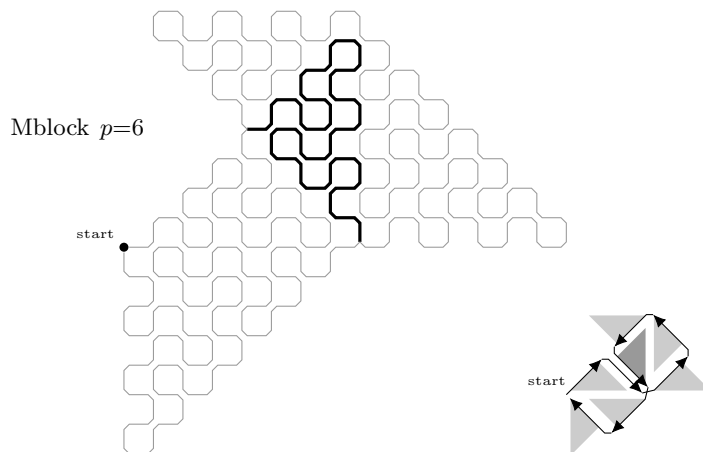
As noted in `a073057-code.gp`, the morphism expansion is the segment directions expansion in the alternate paperfolding curve (with 90° turns). The following drawing is `Mblock(5)` “figure of 8”, with segment ends chamfered off to see the path taken by the curve.



The outline at the right shows the figure-of-8 sub-curves, and the triangle beside each is the region it fills. The two middle vertical sub-curves are identical and traverse their region twice (the dark shade triangle, and thick black curve).

A square of curves is a “twin alternate” (as I call it) and it fills a parallelogram. The two squares of curves are two parallelograms, one sideways, one vertical, overlapping.

The following `p=6` has the figure-of-8 now in mirror image and rotated 45° . When holding the first segment fixed, as here, it’s the nature of the alternate paperfolding to have sub-curve ends alternate in mirror image this way, according as odd or even expansion level.



The full A073057 sequence comprises Mblocks of ever greater p . Each starts at the origin and returns to the origin, so that the whole sequence continued infinitely makes infinite re-traversals of all segments in the $5/8$ of the plane filled by the odd and even p cases.

For example, the following is the shape after $k=8$ append and expand steps, which is the first 4.3^8 segments and the union of Mblocks $p=0$ to 8. Similarly $k=9$. Notice $k=9$ is the same large-scale shape but mirror image and rotate 45° .

