

Great Galloping Gosper Glider Gun

a flipbook by Jeffrey Copeland

Several weeks ago, I was discussing odd computer languages with my friend and colleague Donn Terry over lunch. The proximate cause of the discussion was something I mentioned to Ned Brooks recently, to wit, that I had managed to come up with a fix for a bad bit of hackery in our corporate printer farm because I was the nearest person who both cared and knew enough of the page description language PostScript. In any event, Donn noted that I might be one of the few people who could knock off an implementation of John Conway's cellular automata game, Life, strictly in PostScript.

Never one to resist a challenge, particularly one that is both amusing and easy-to-fulfill, I did just that. Furthermore, I realized that a PostScript version of Life was the perfect excuse to print a flipbook. I began by producing a 150-page rendition of the Bill Gosper's "glider gun" figure, which generates little spaceships that travel off at a 45-degree angle. I delivered that to Donn last week on the occasion of our having dinner with him and his wife Kathy. (Also in attendance was the now-retired chairman of Donn's PhD committee, who was justly amused.)

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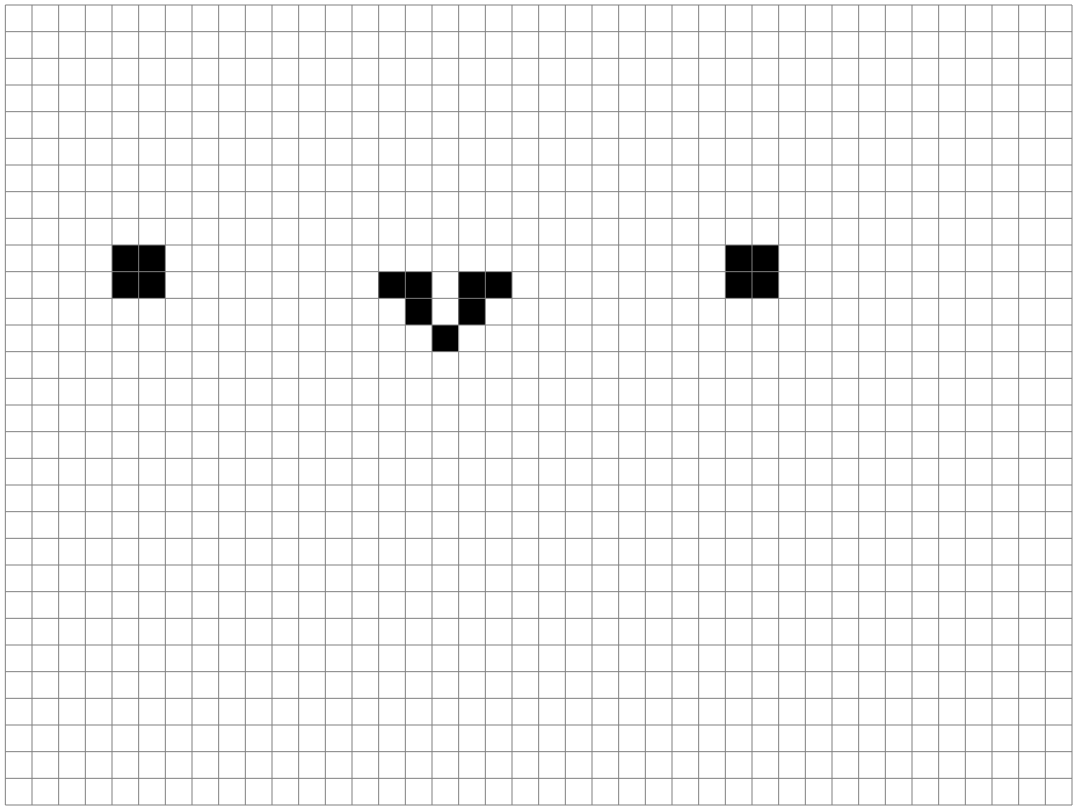
Great Galloping Gosper Glider Gun

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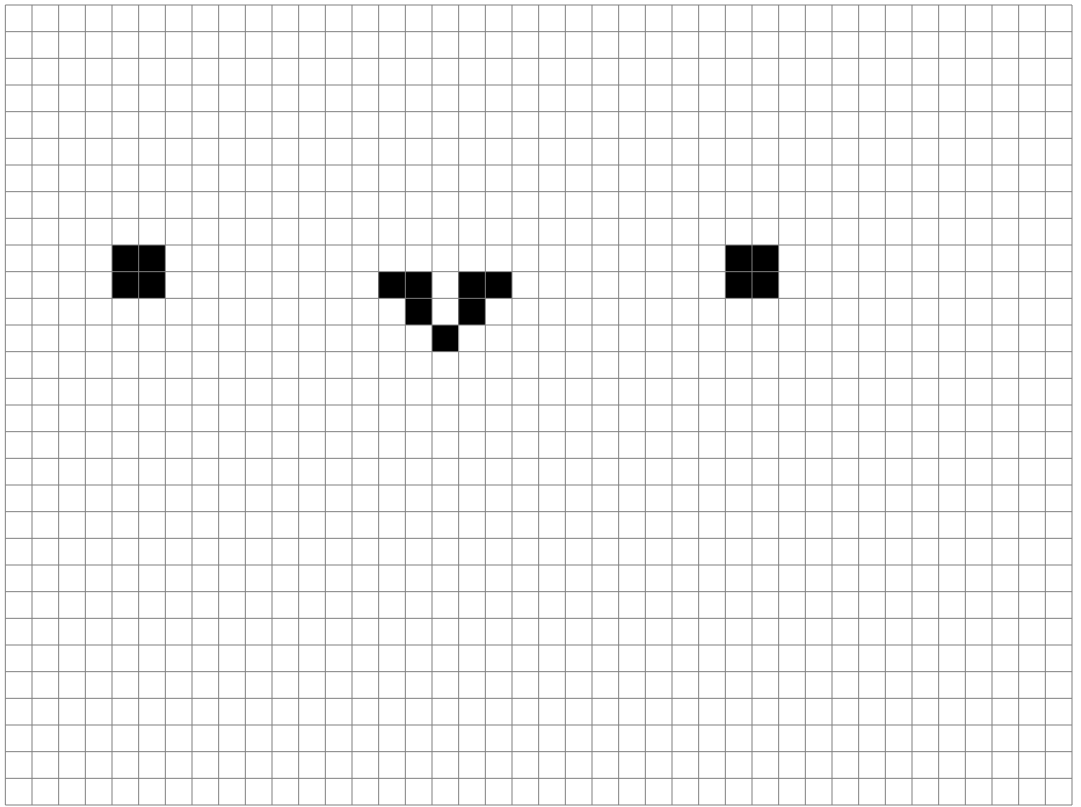
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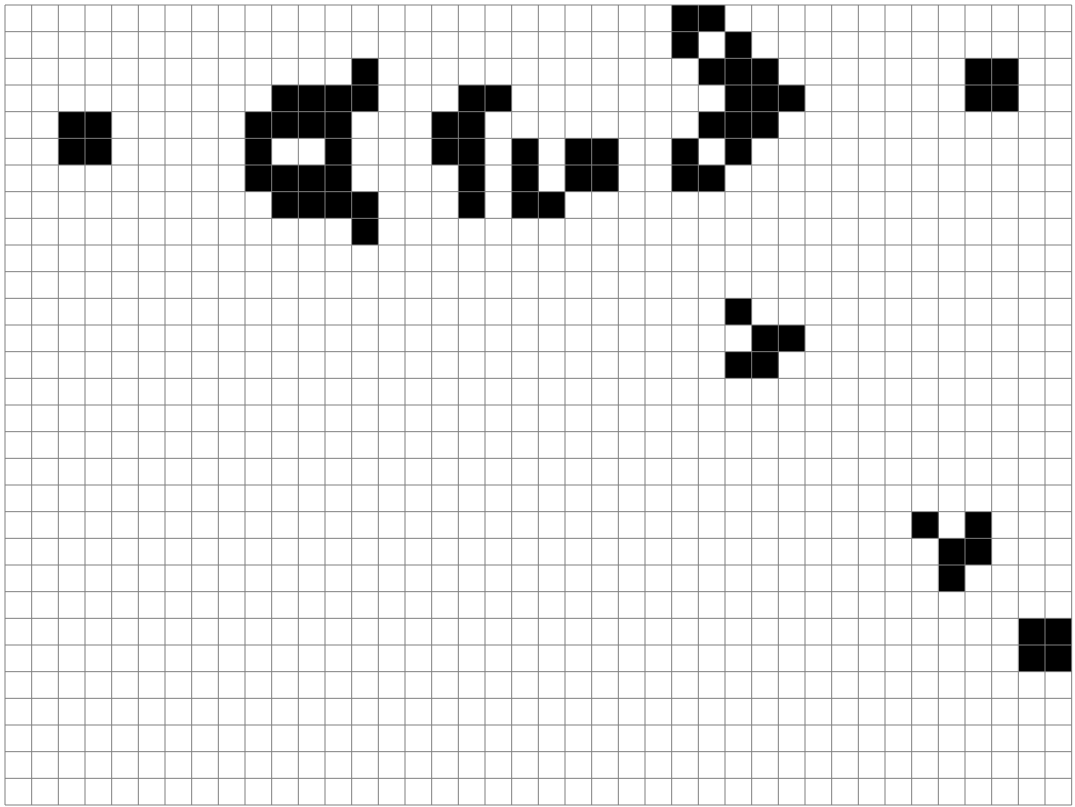
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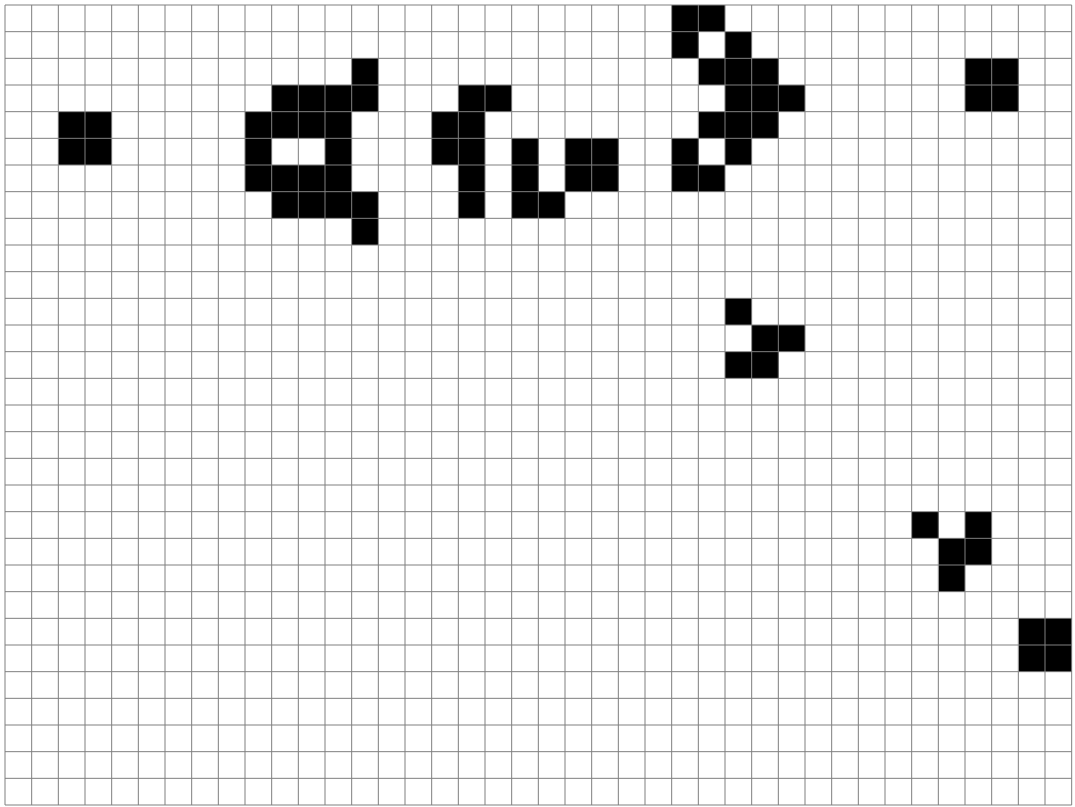
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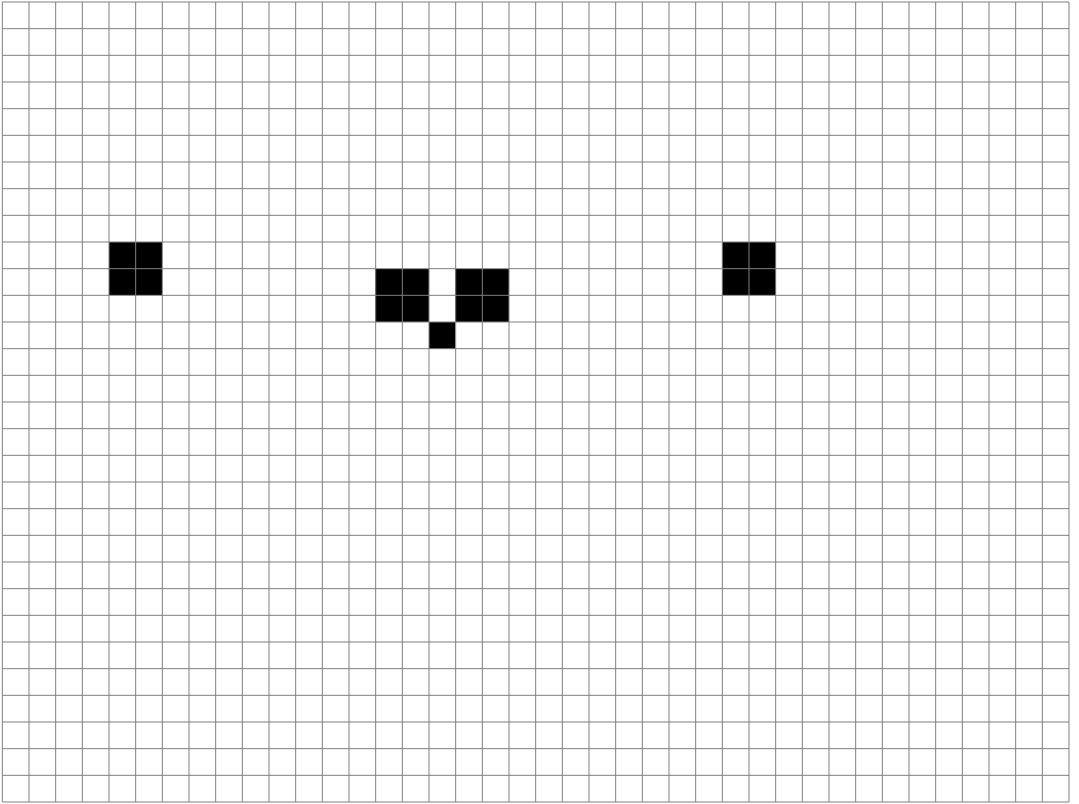
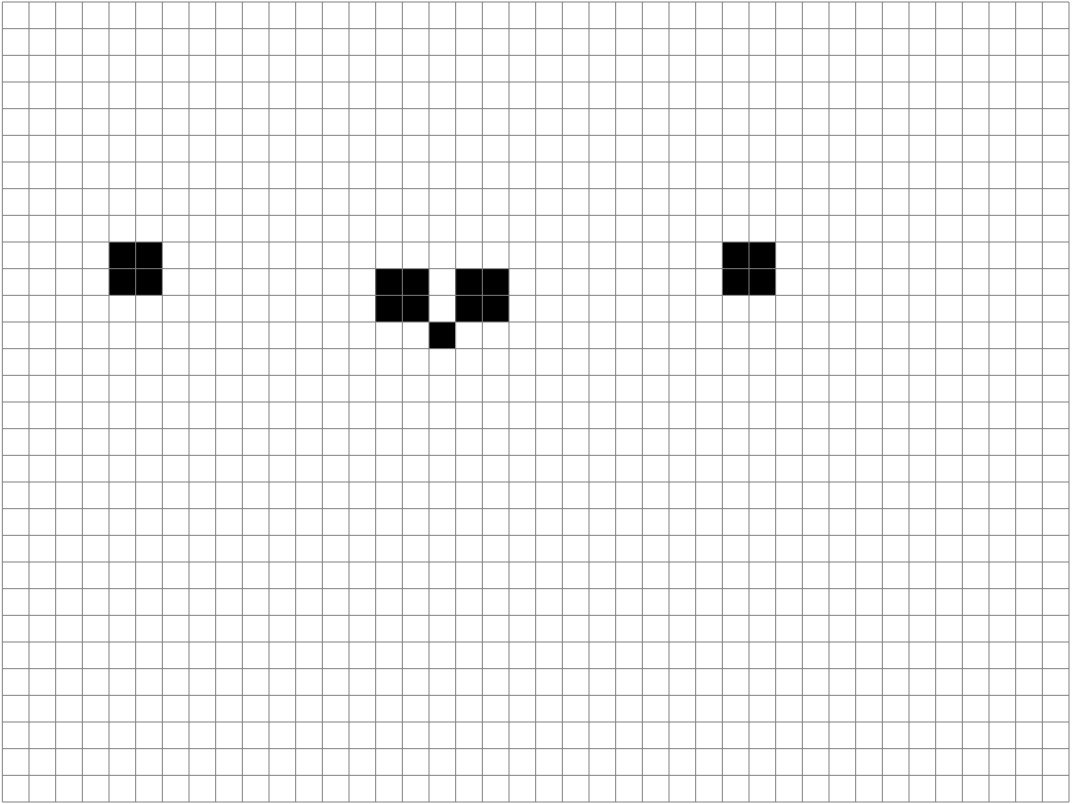
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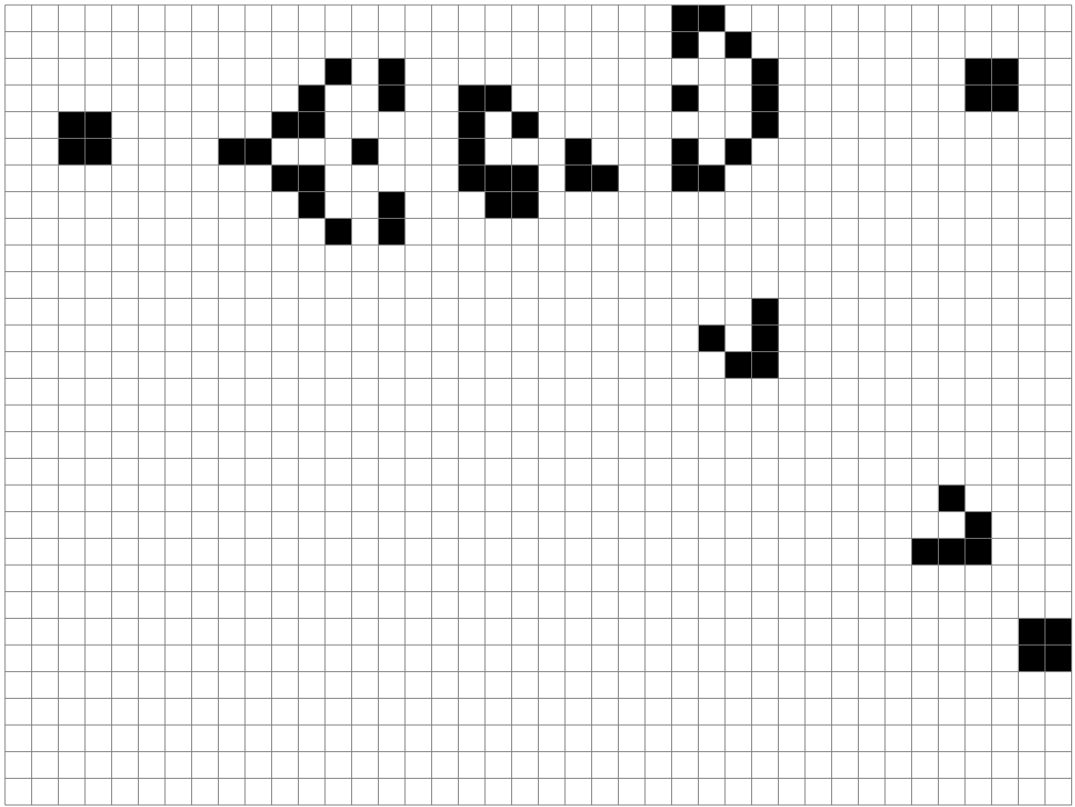


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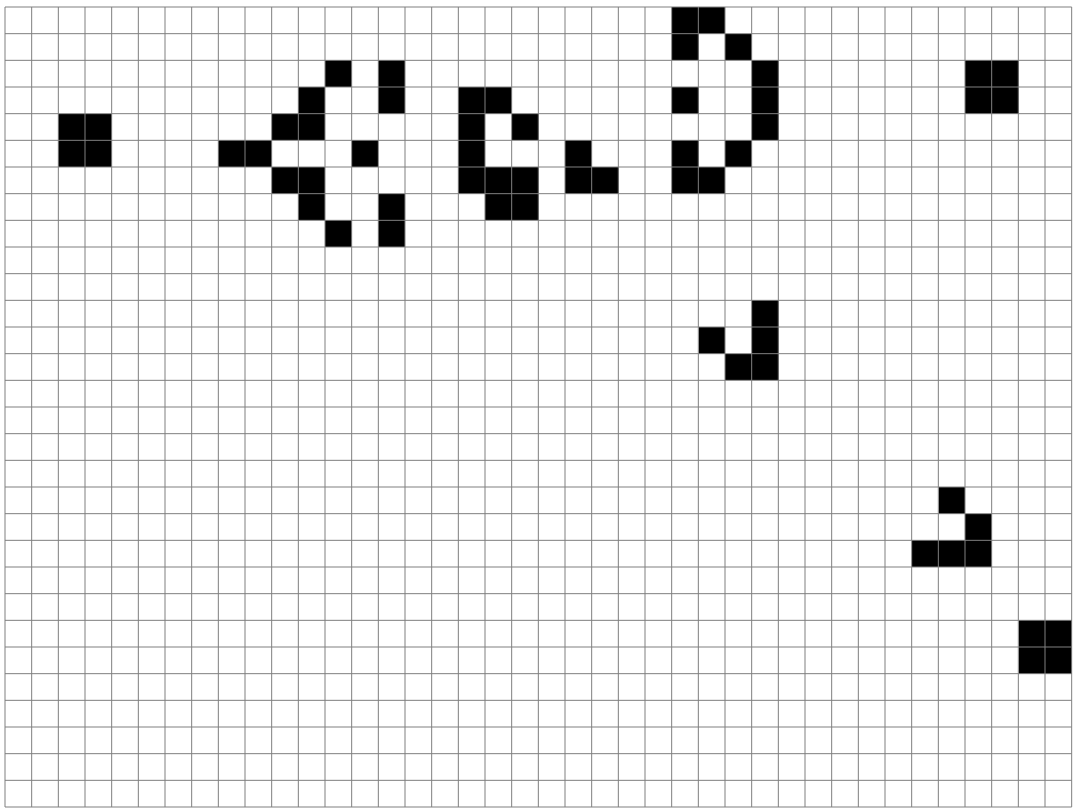


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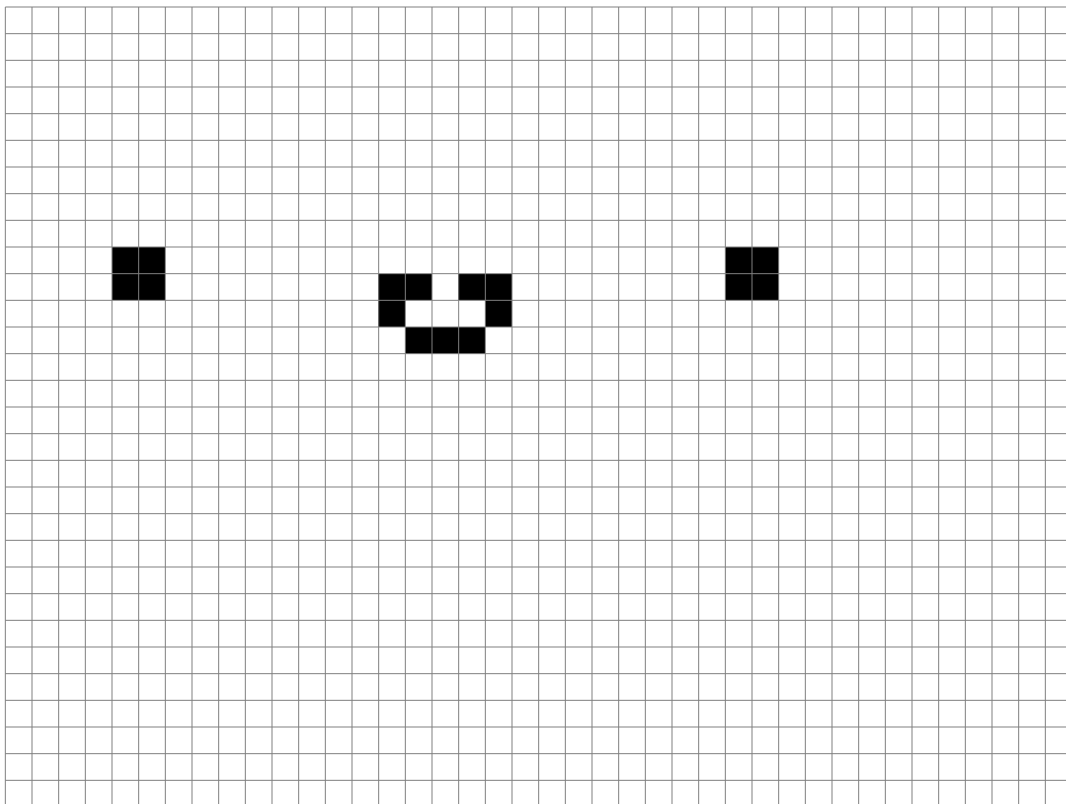




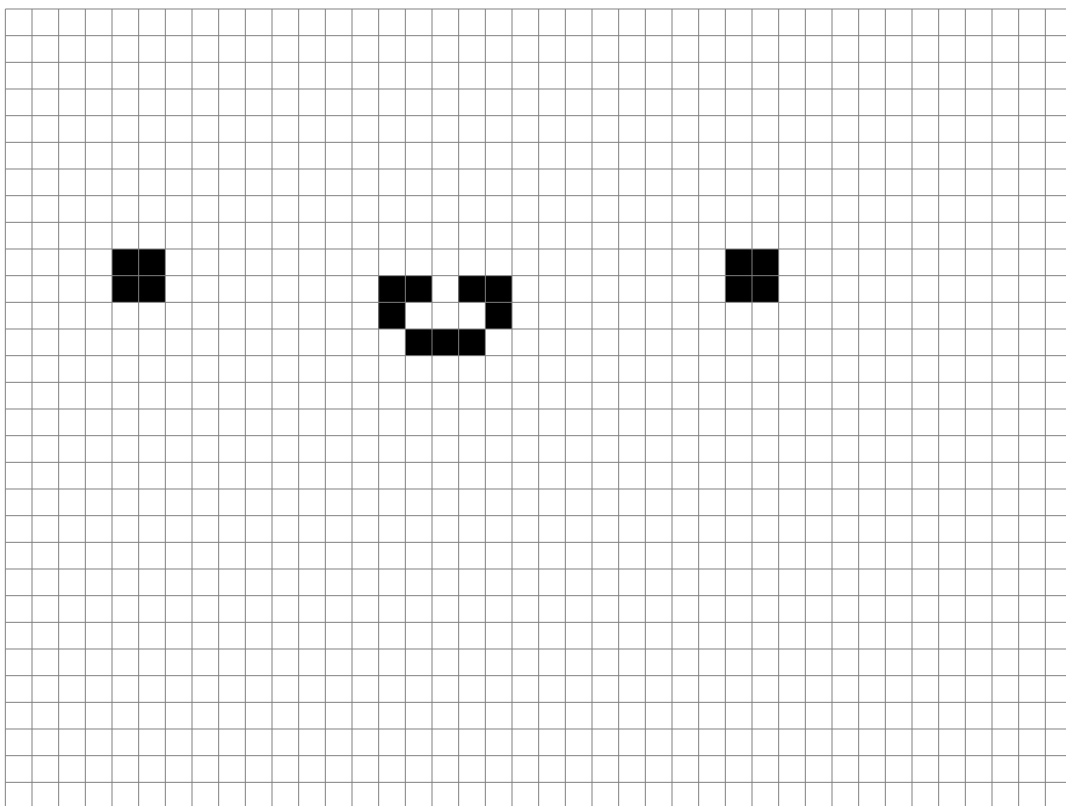
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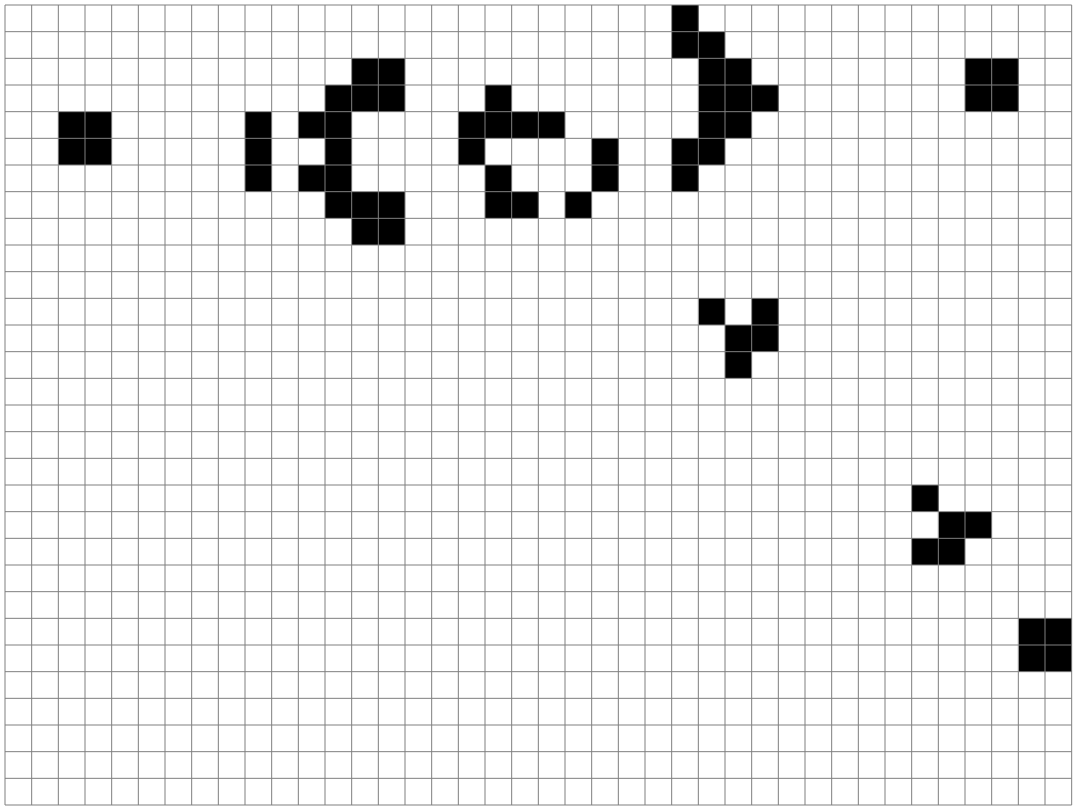
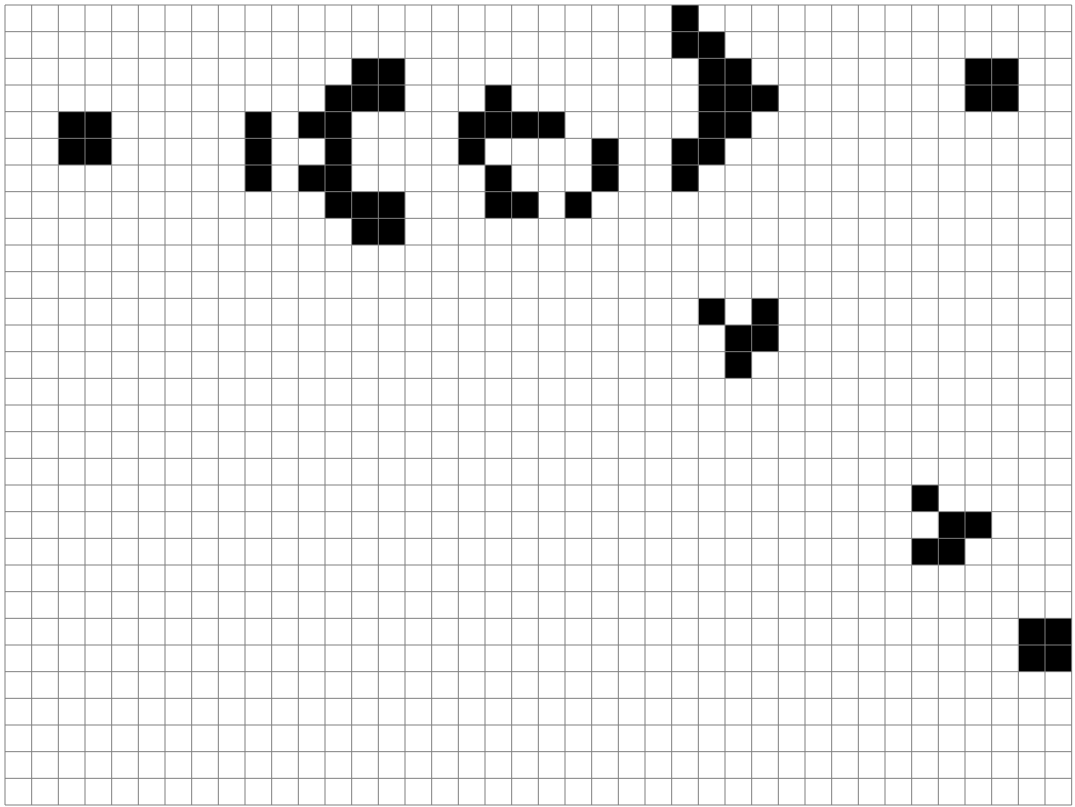
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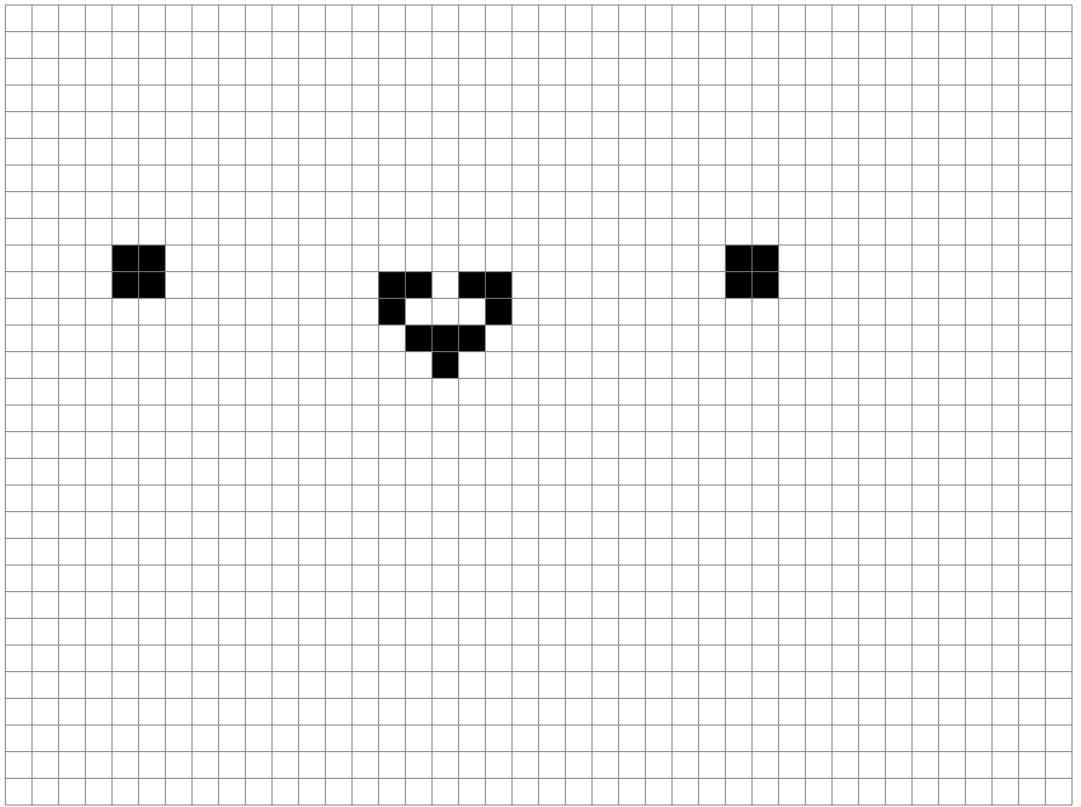
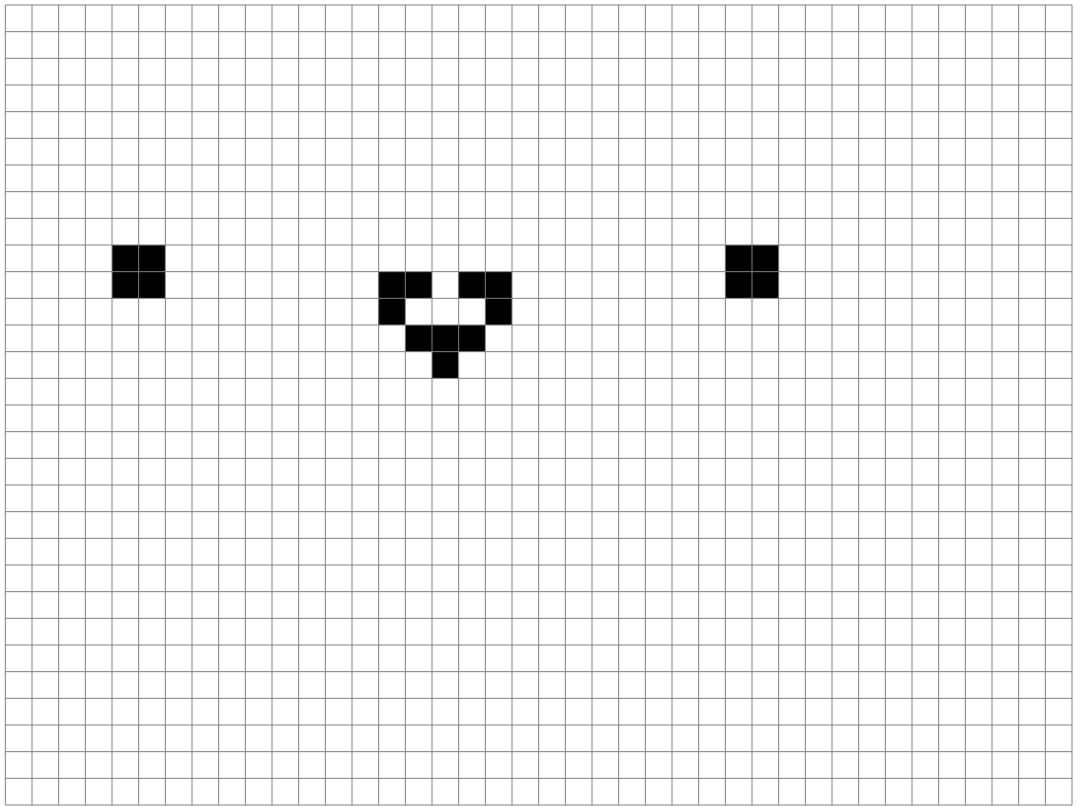


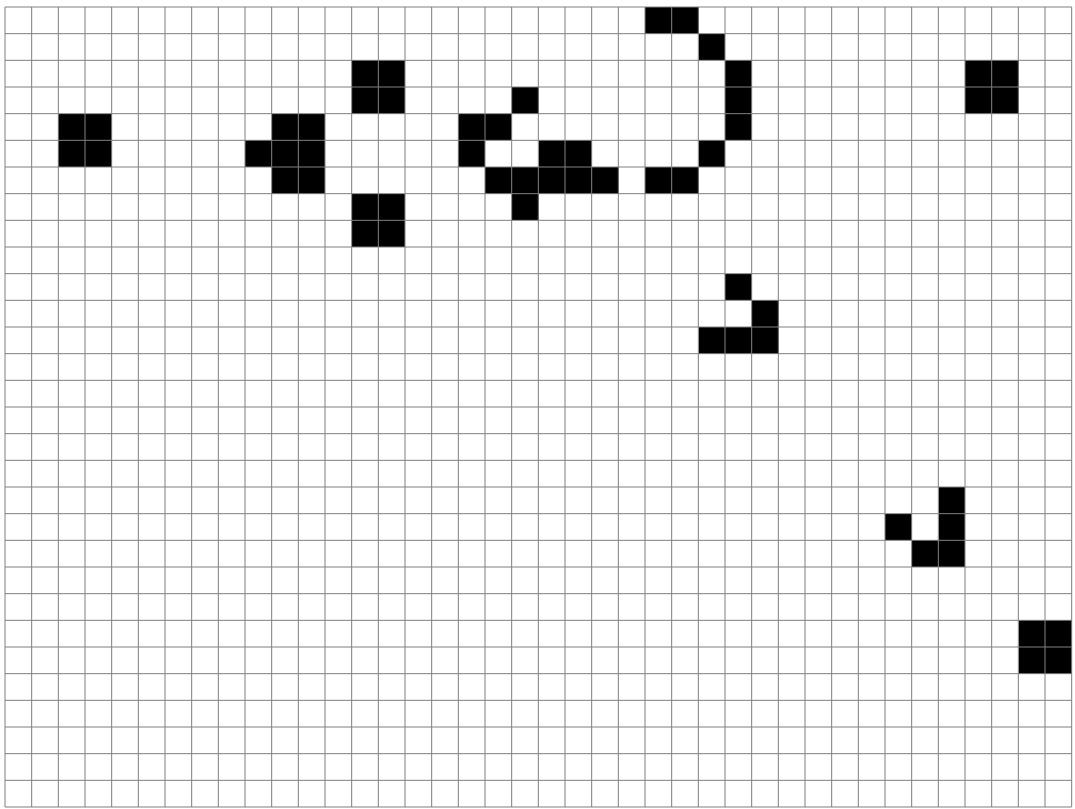
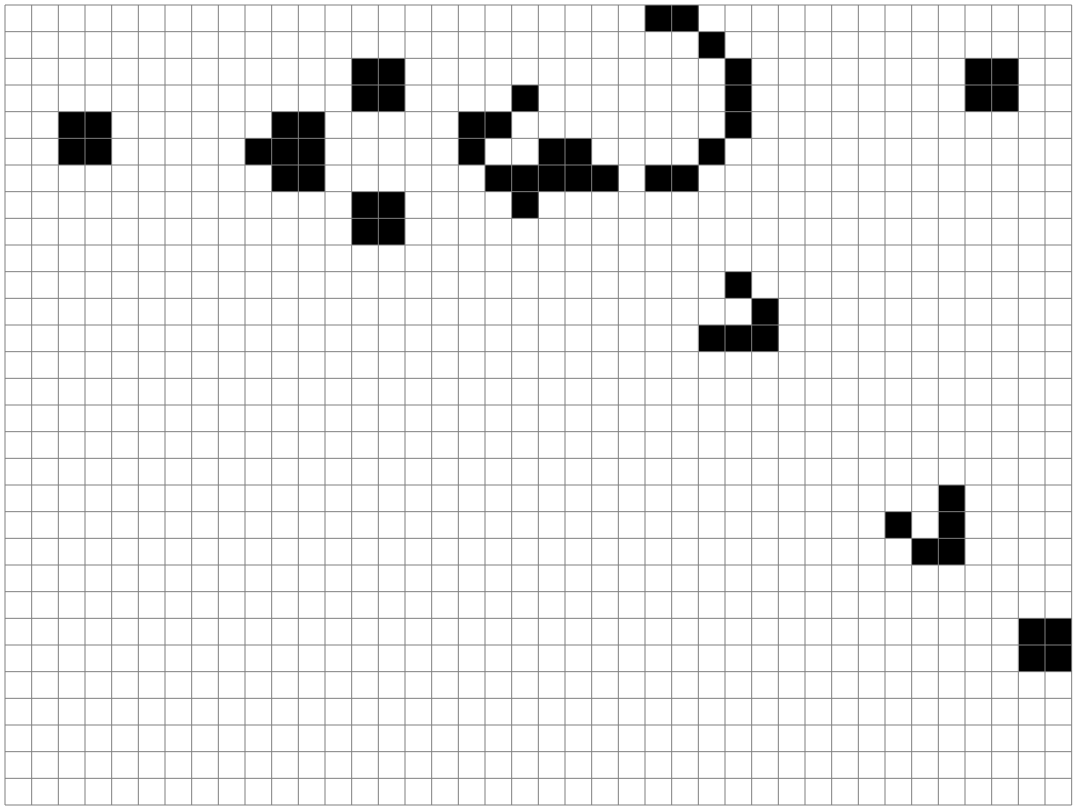
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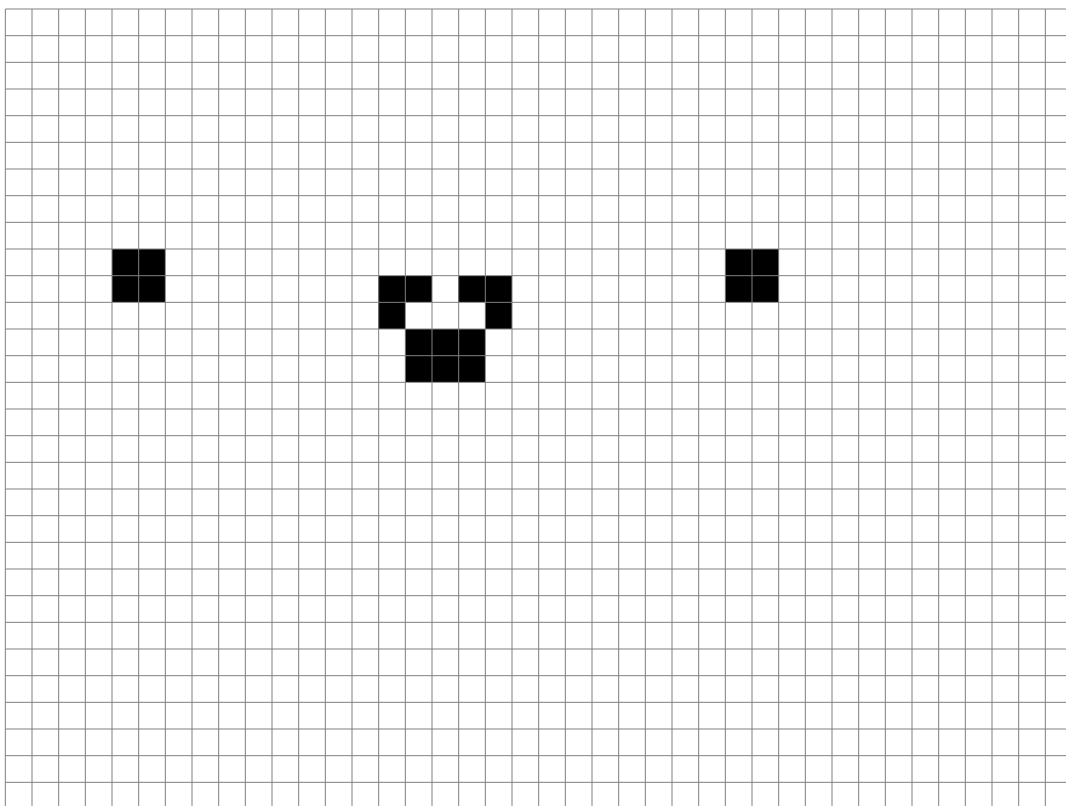


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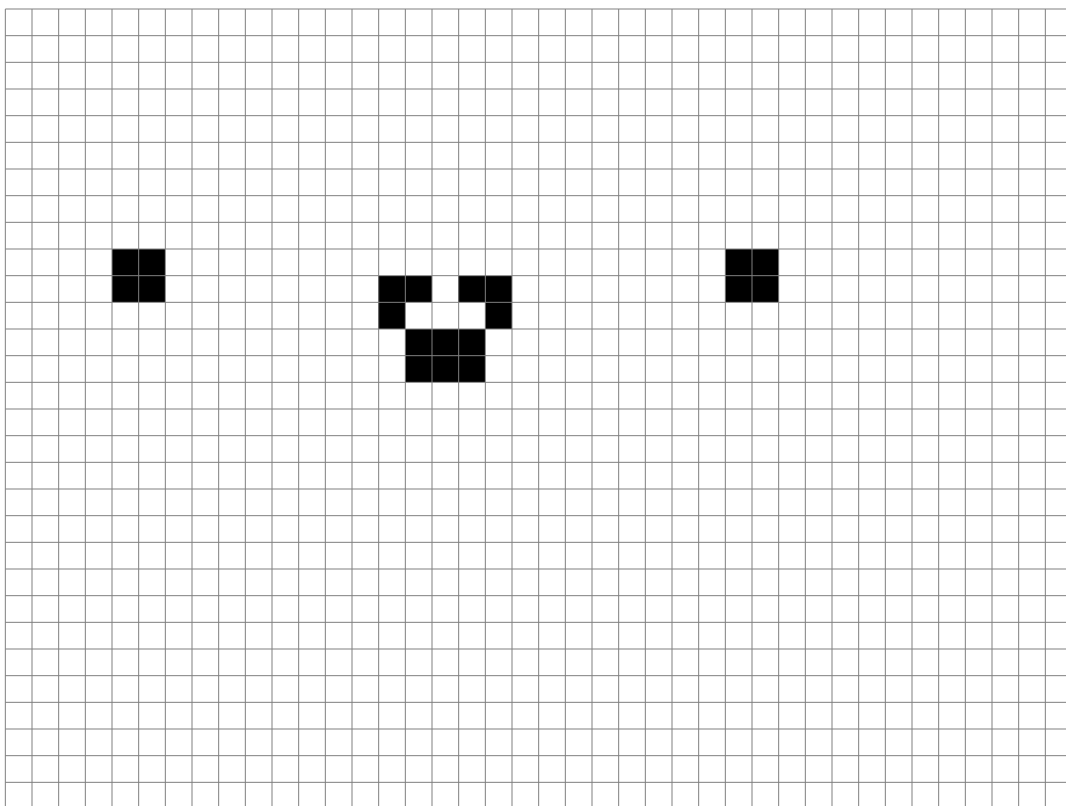




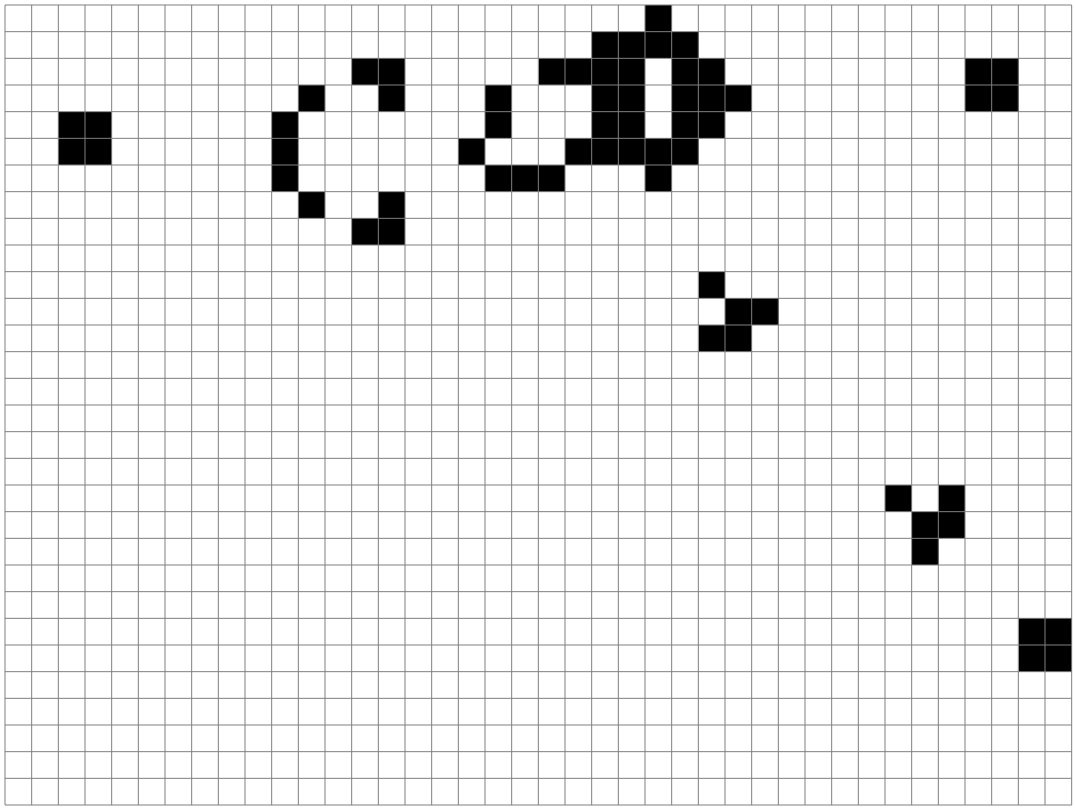




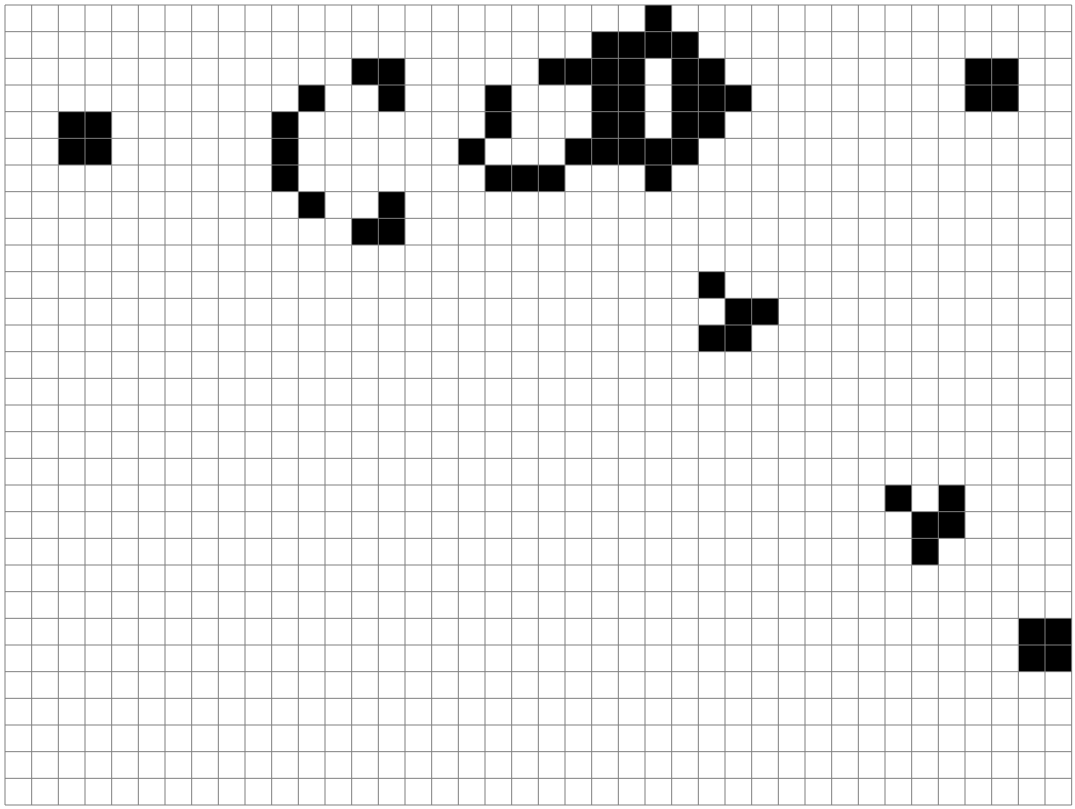
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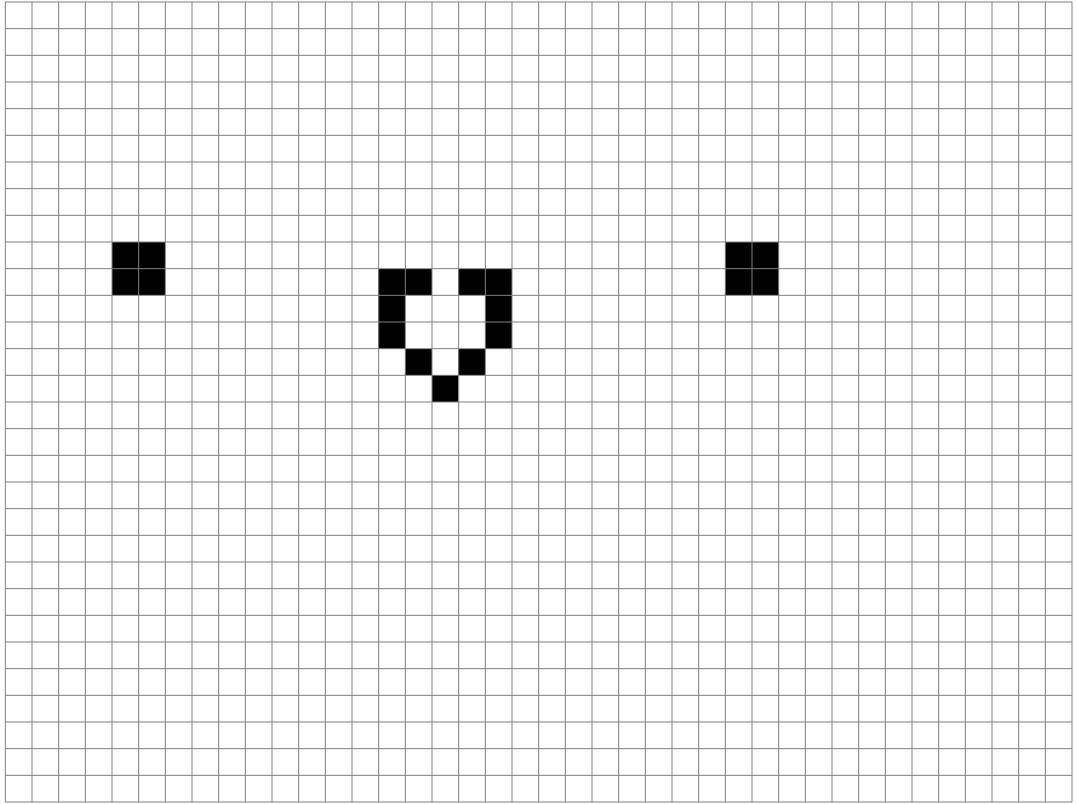
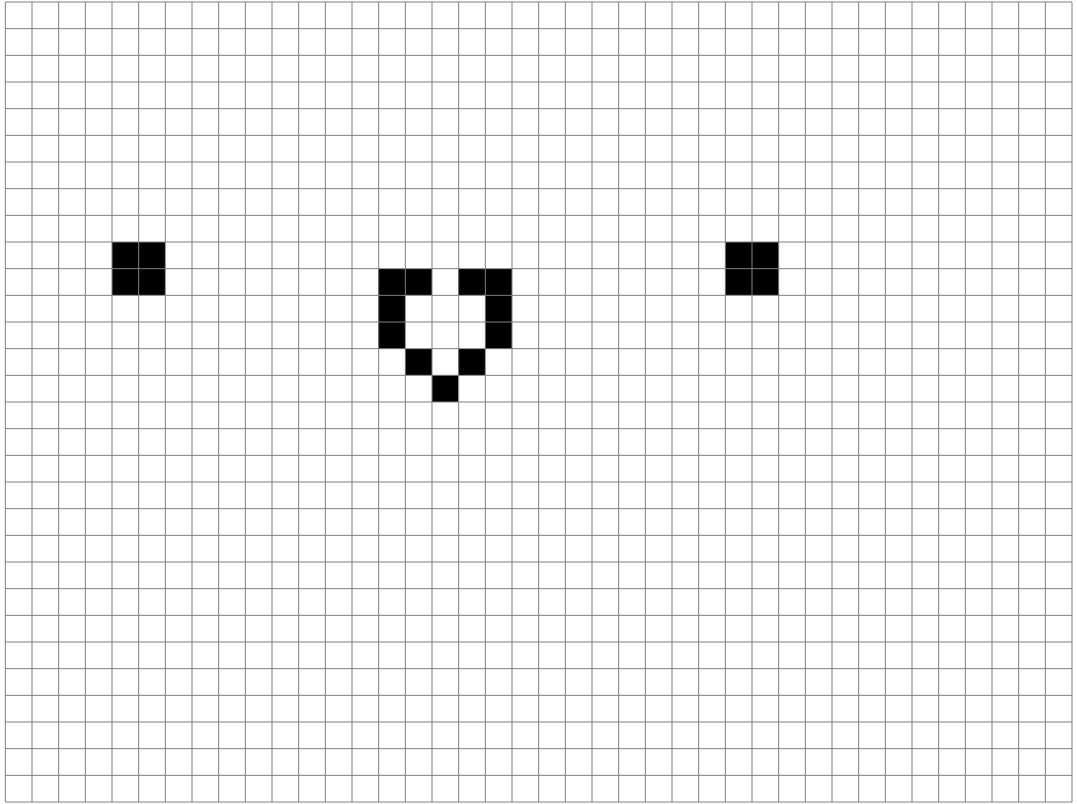
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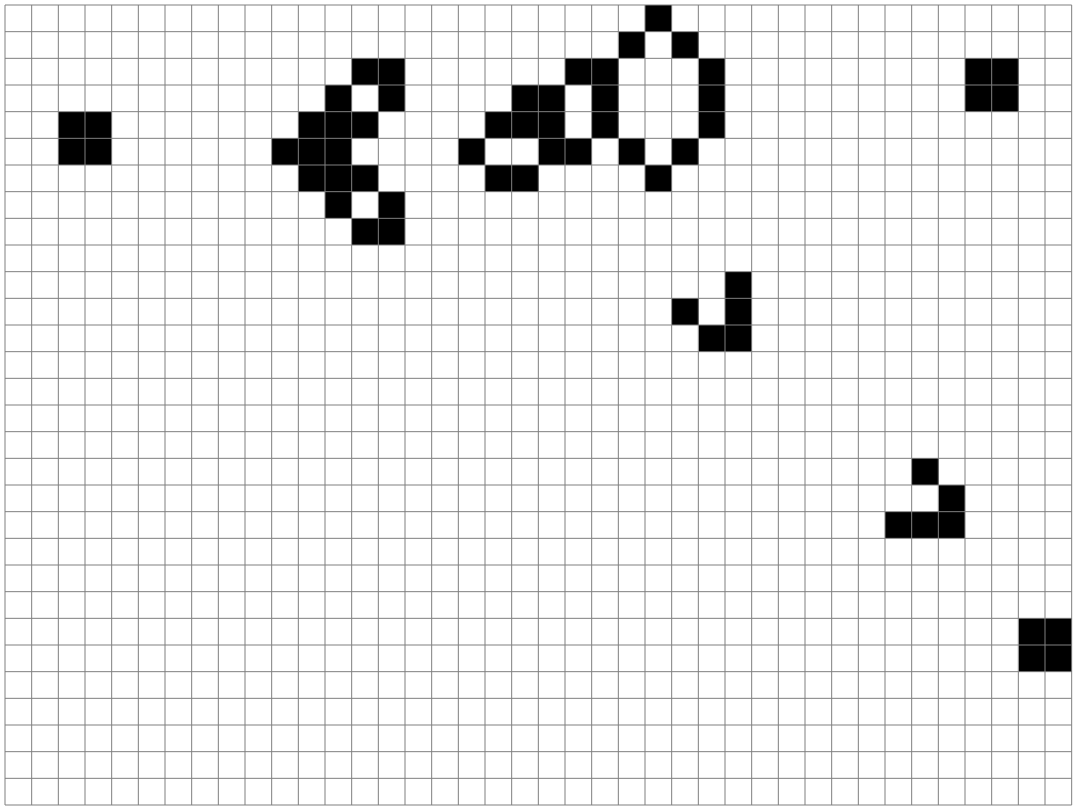


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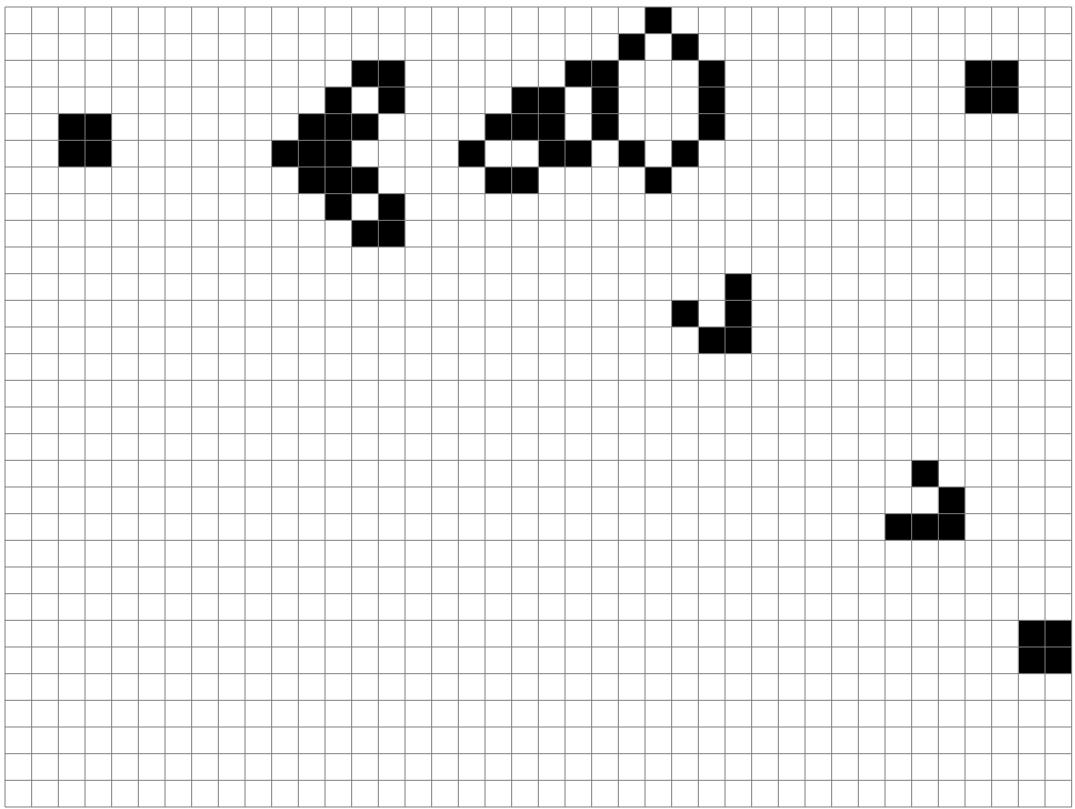


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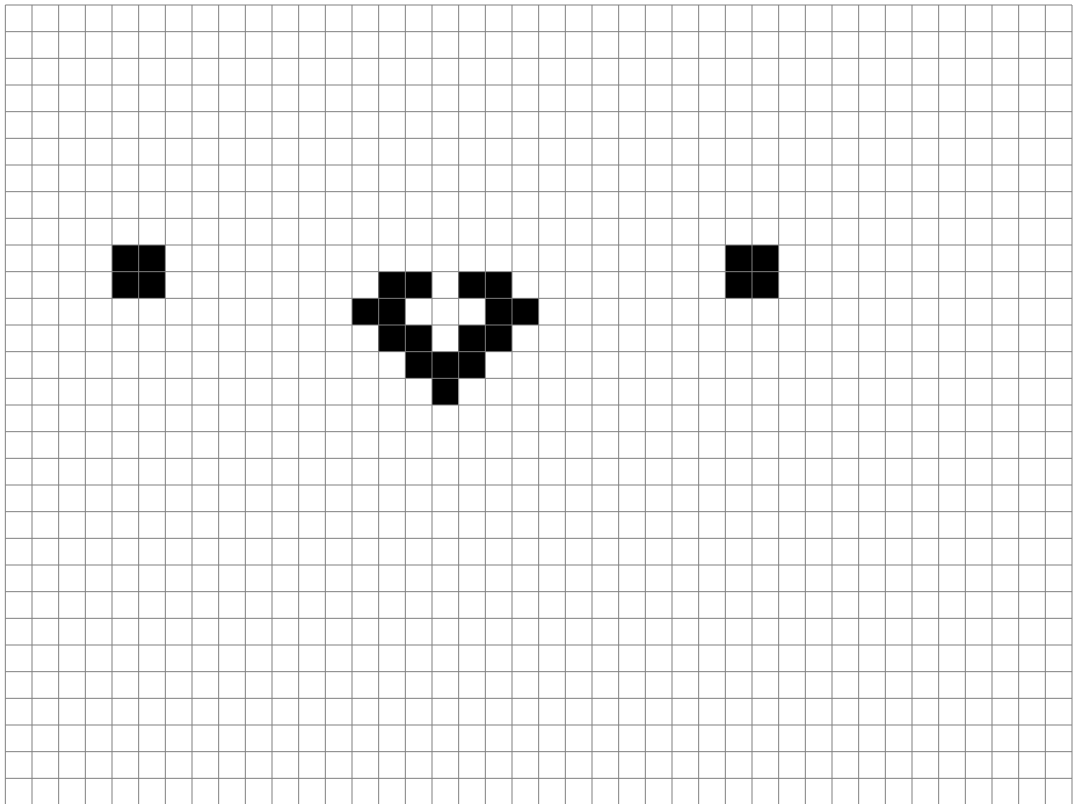




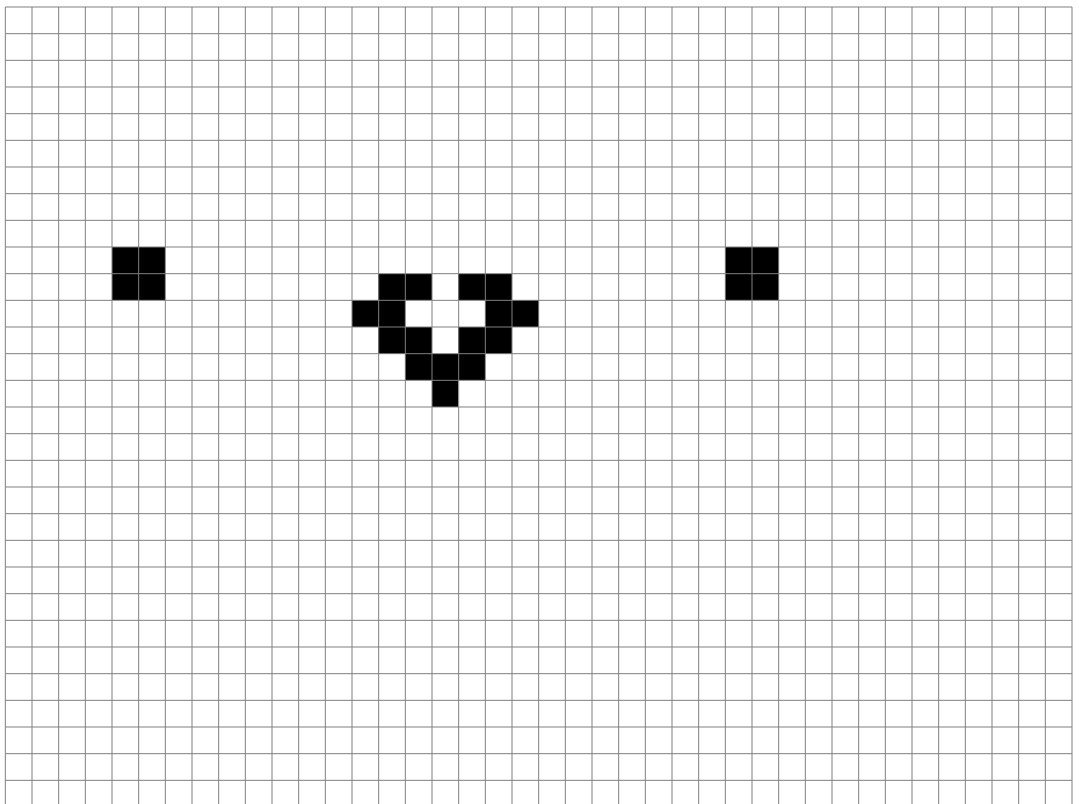
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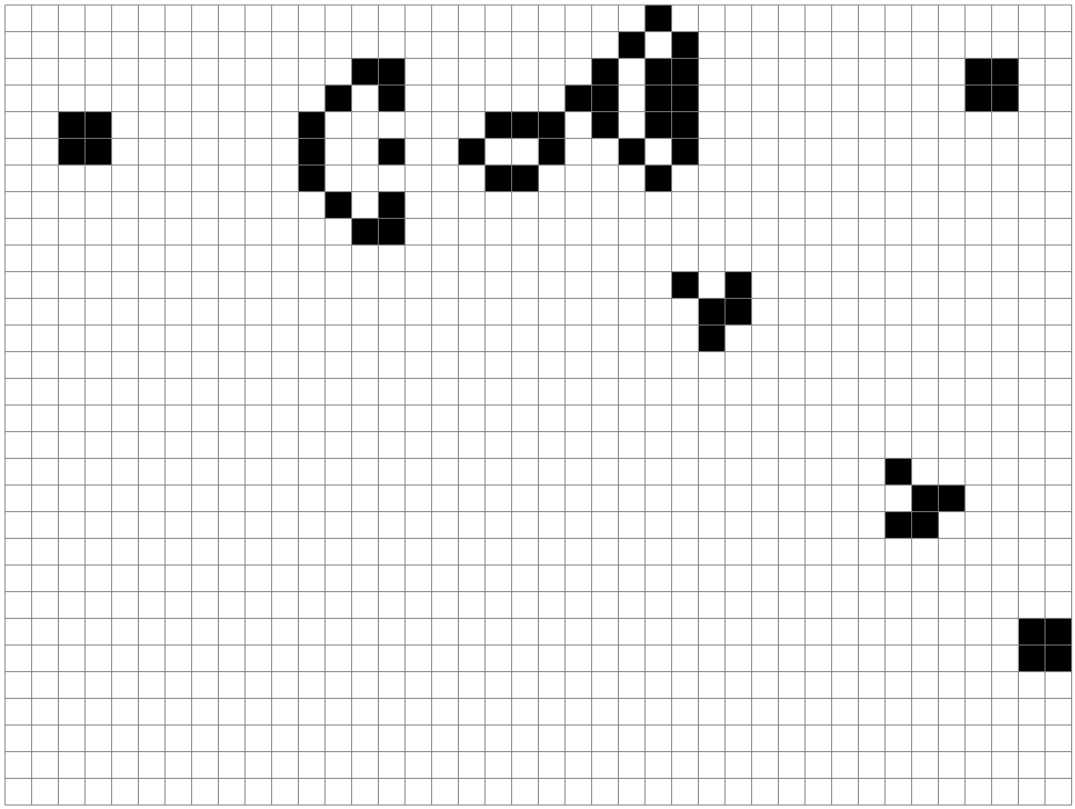
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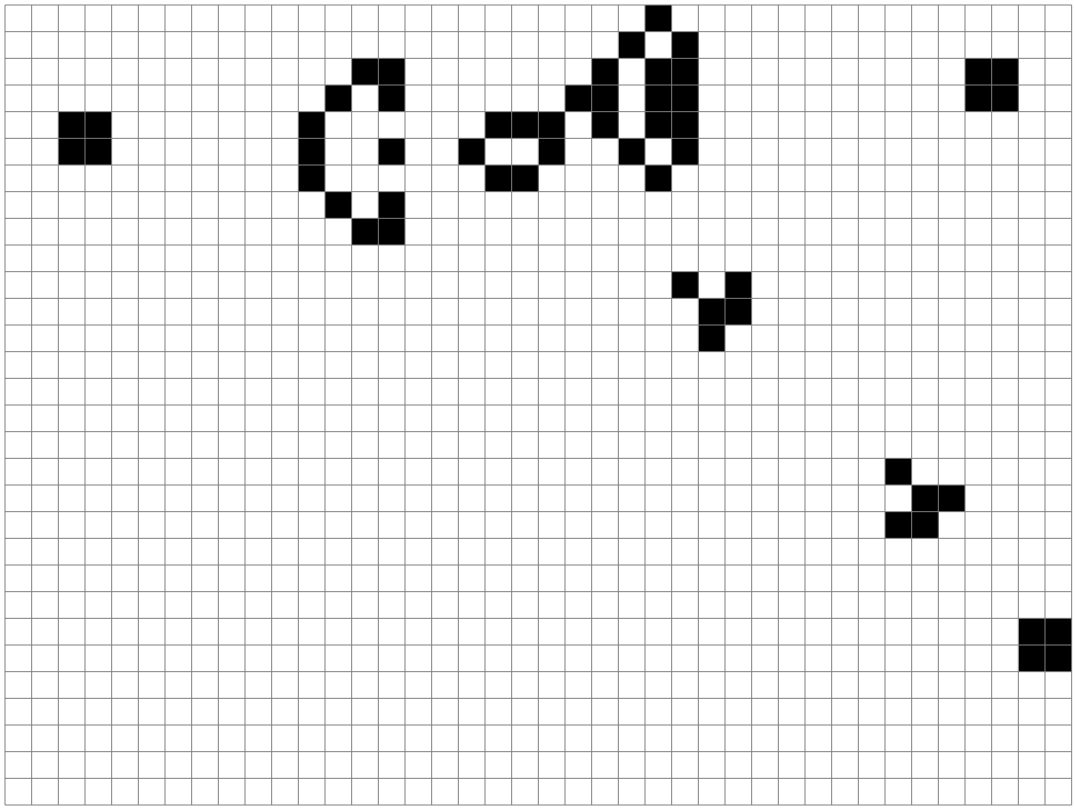
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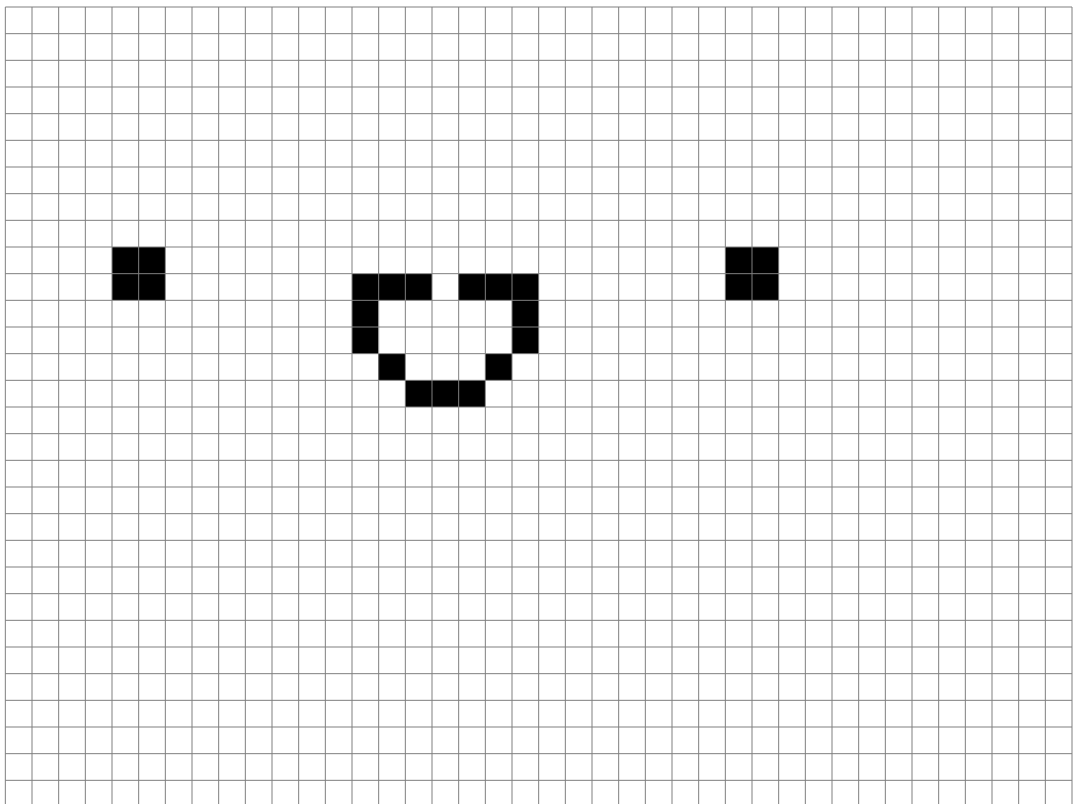
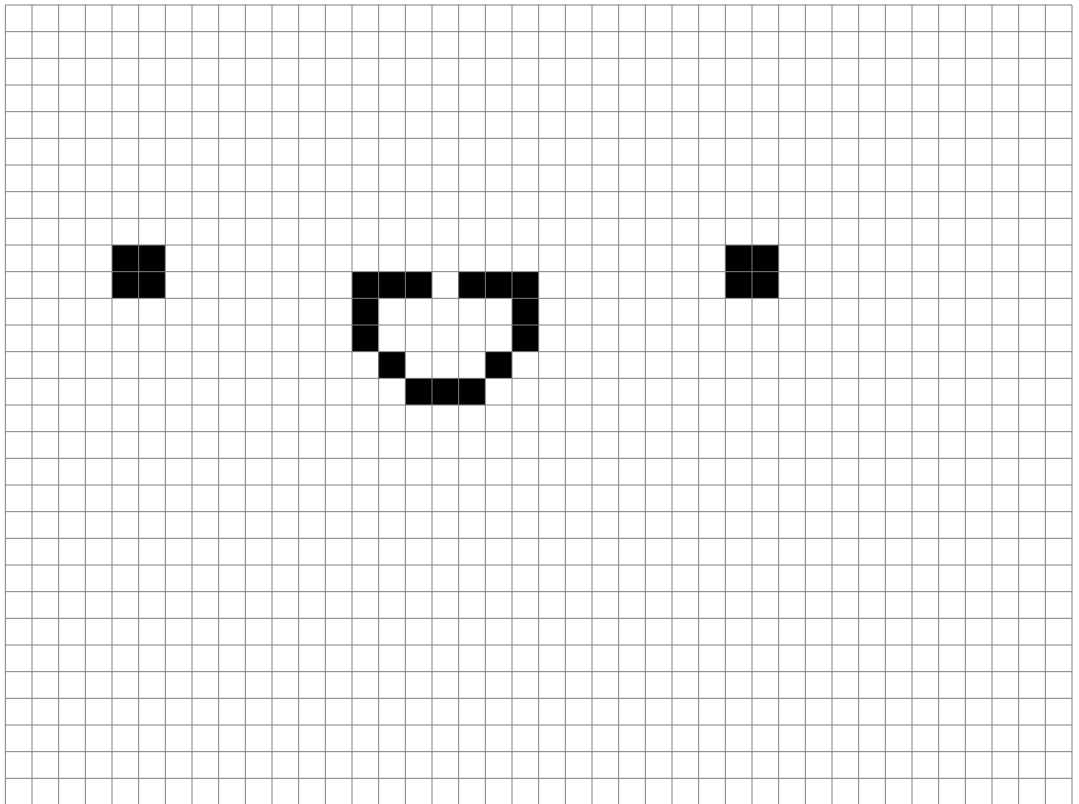
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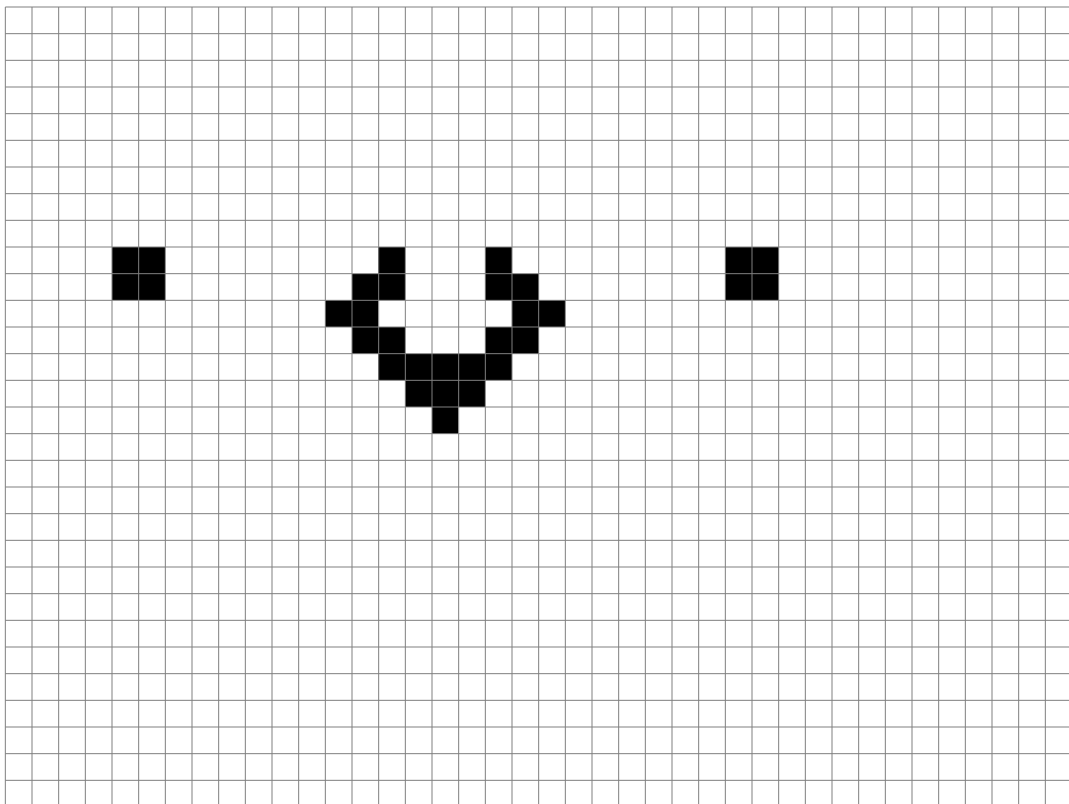
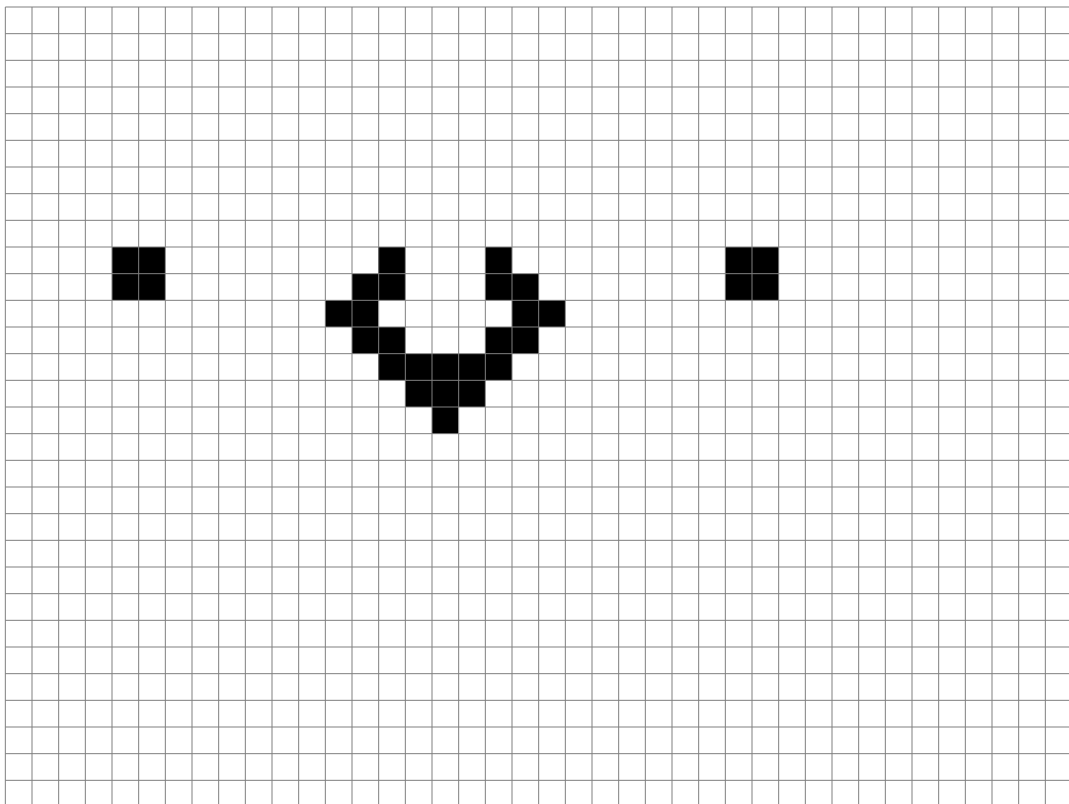


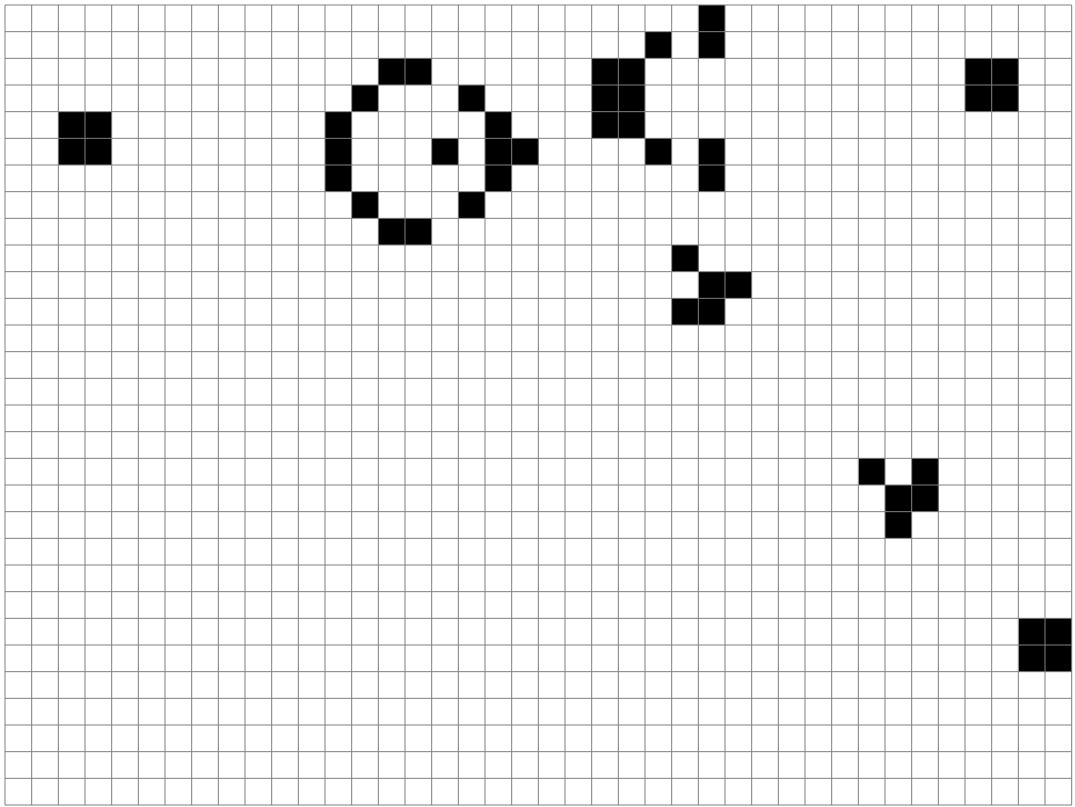
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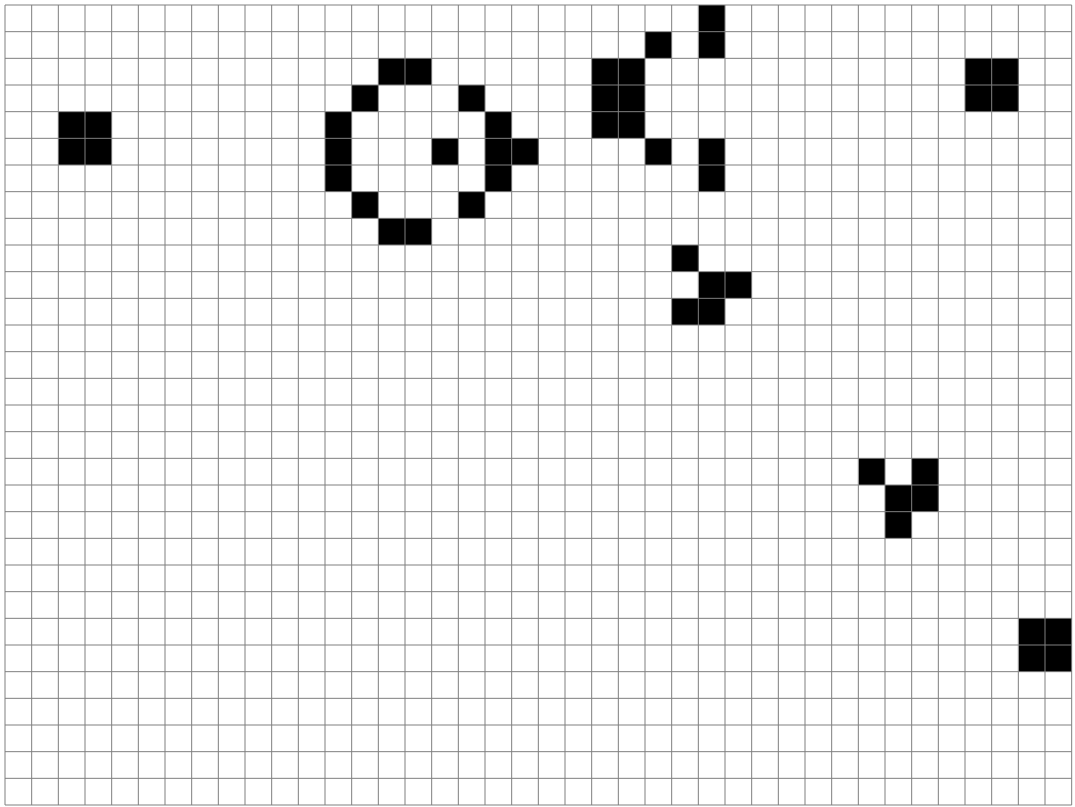
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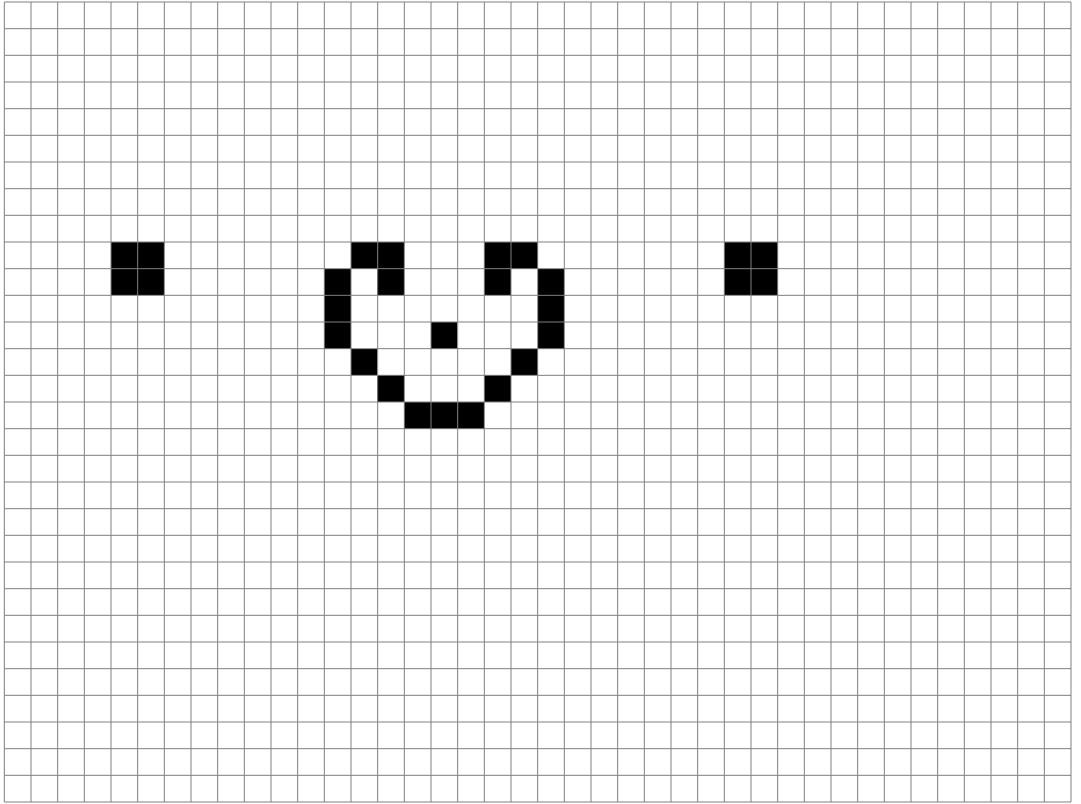




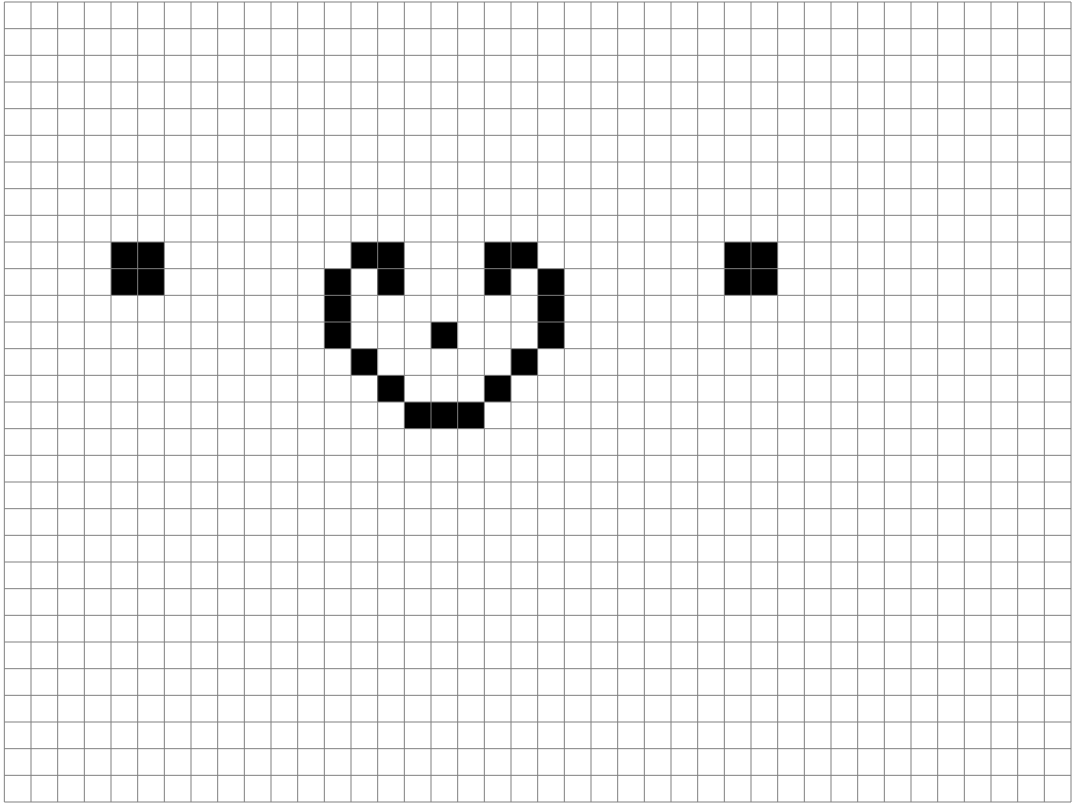
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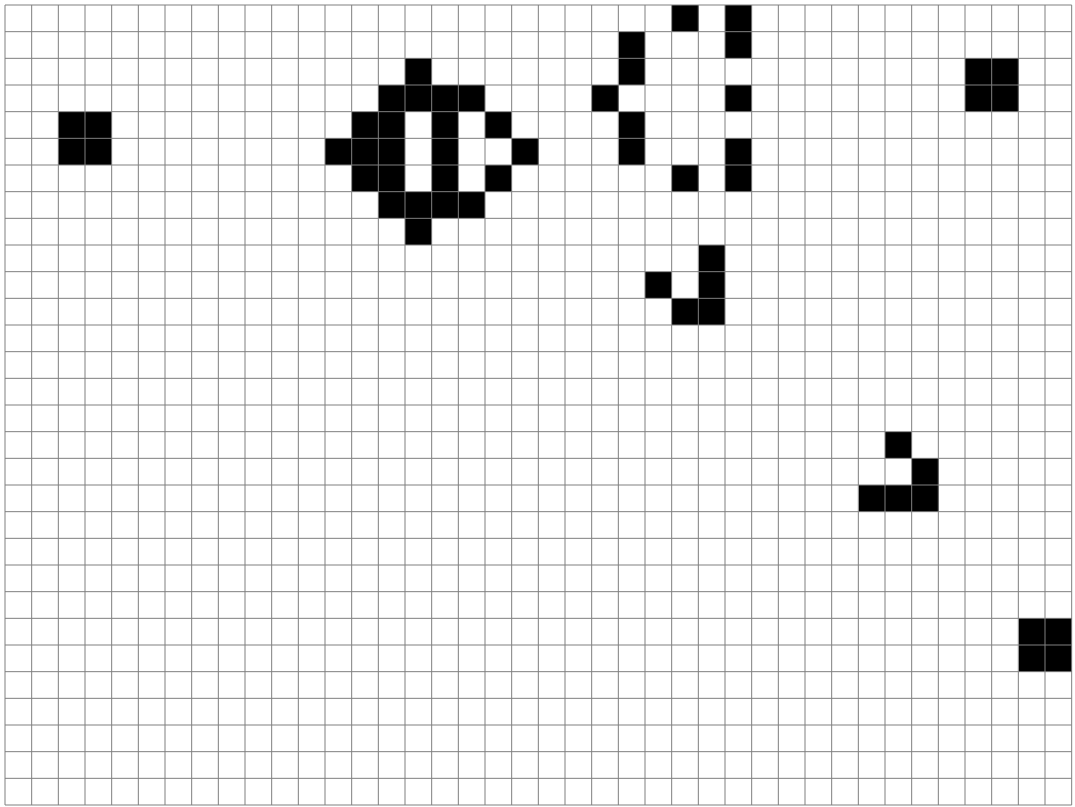
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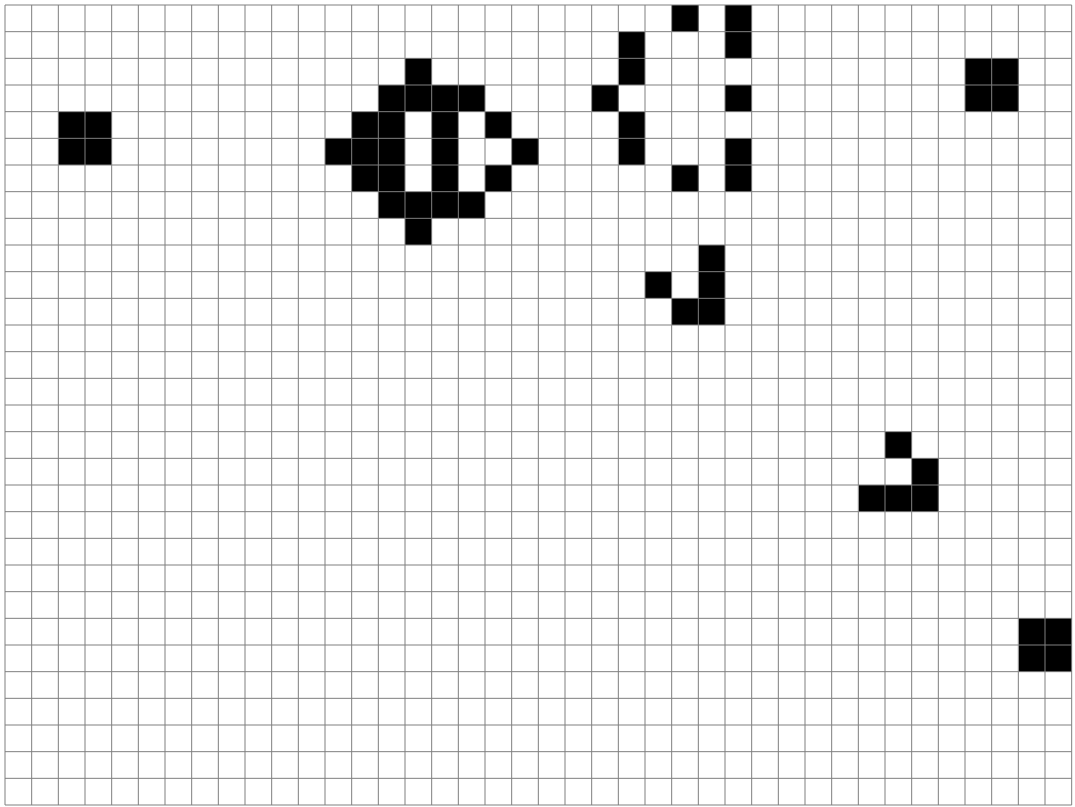
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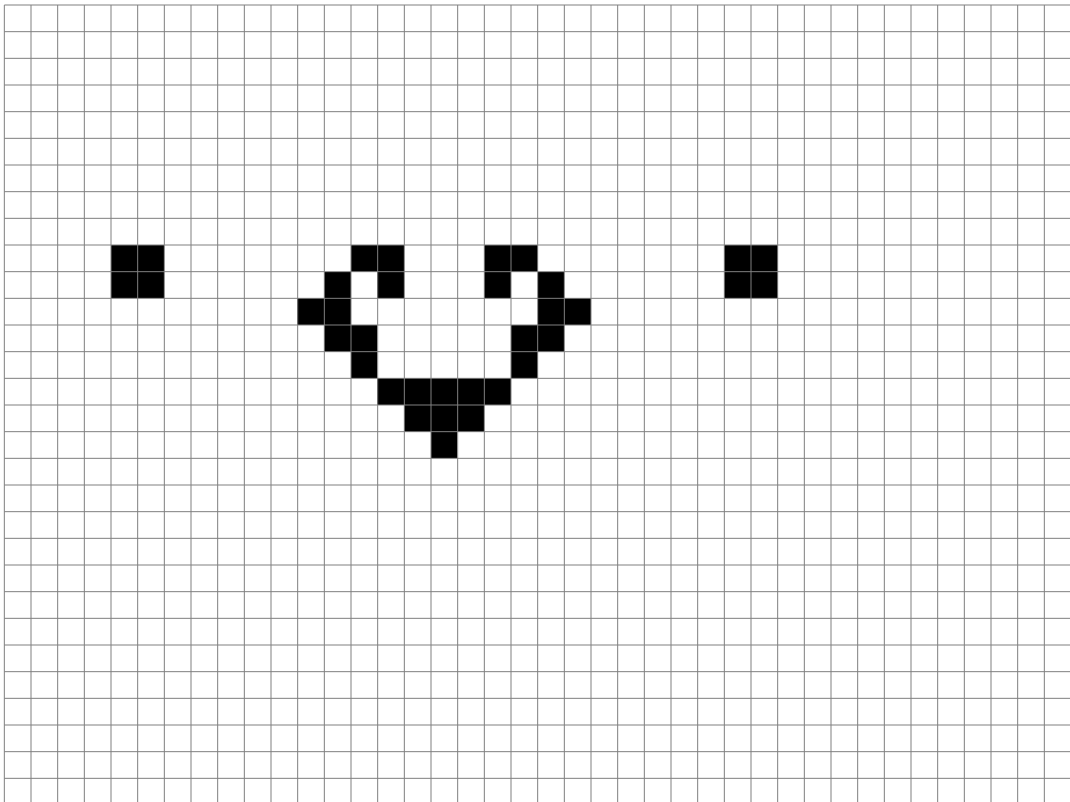
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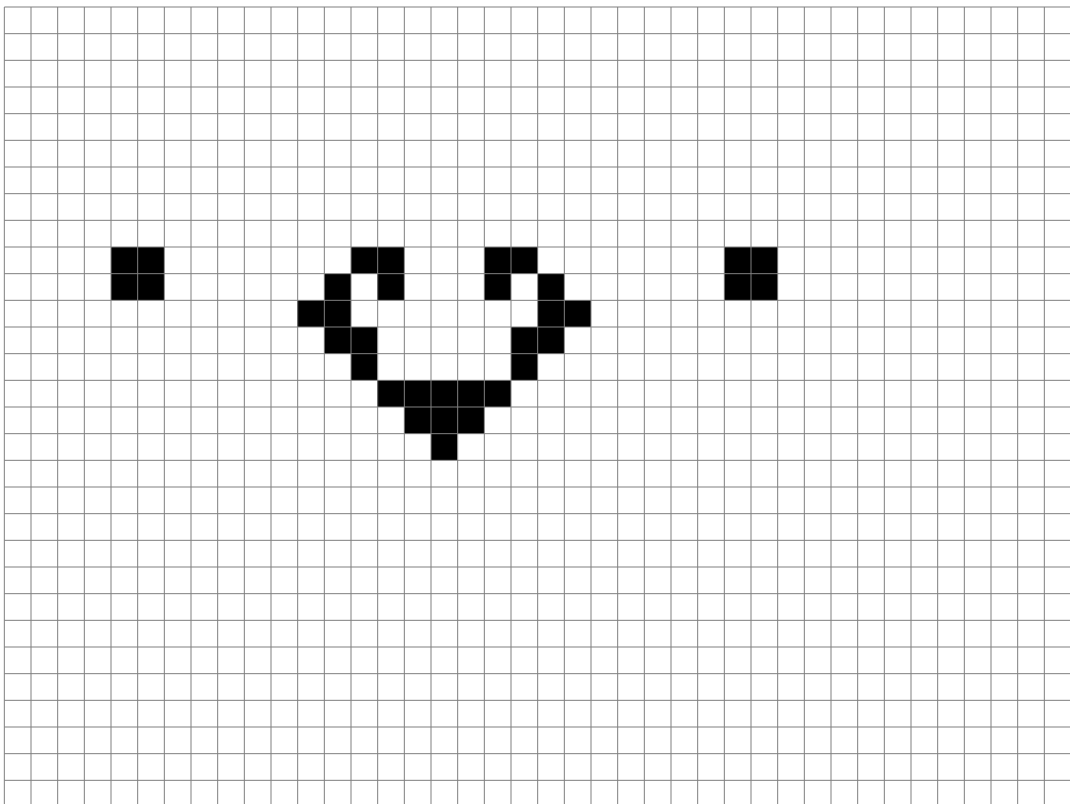
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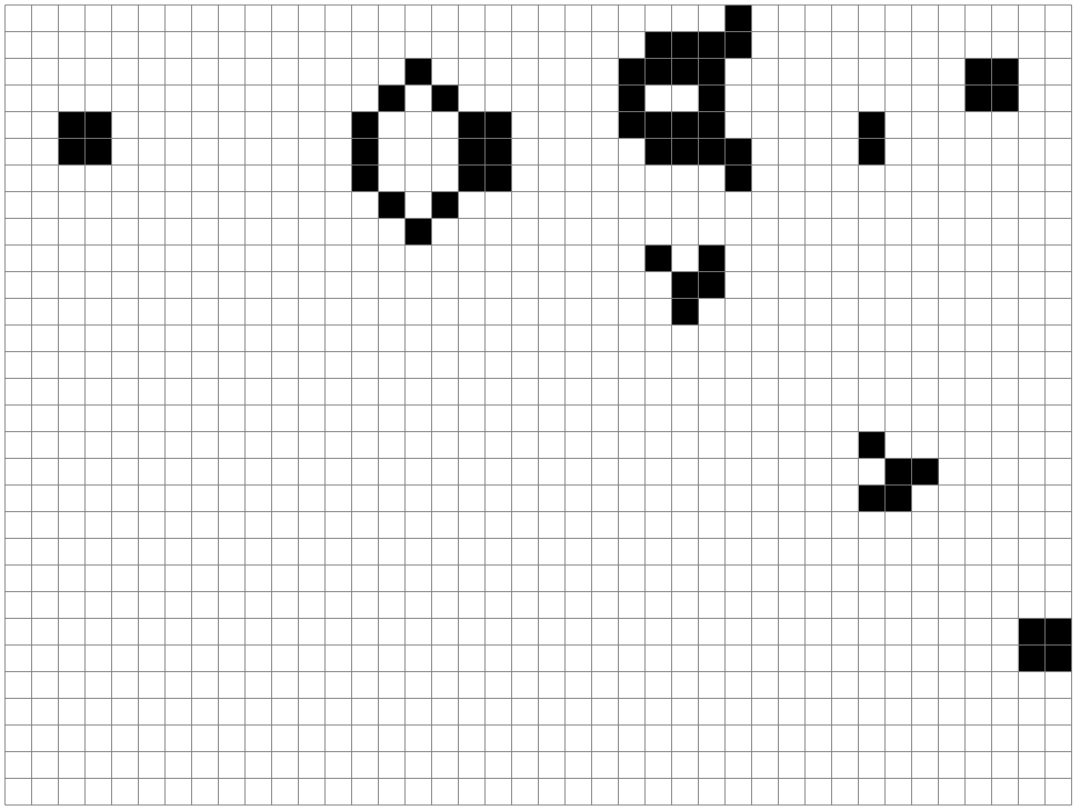
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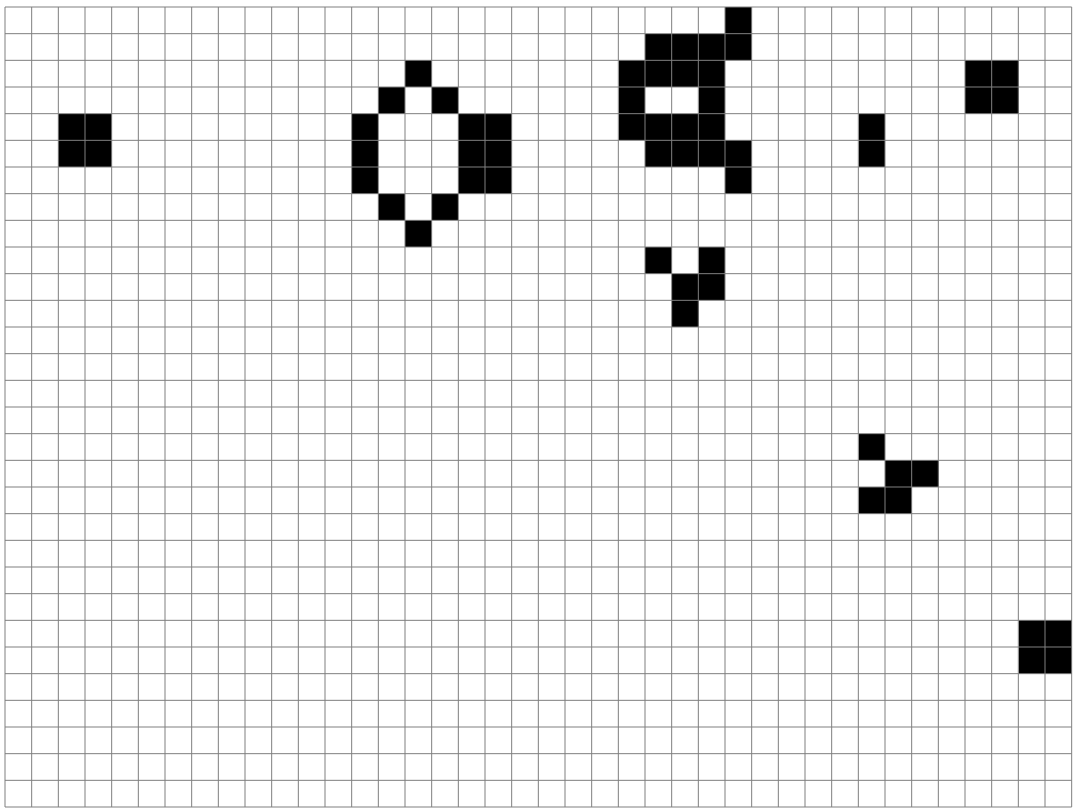
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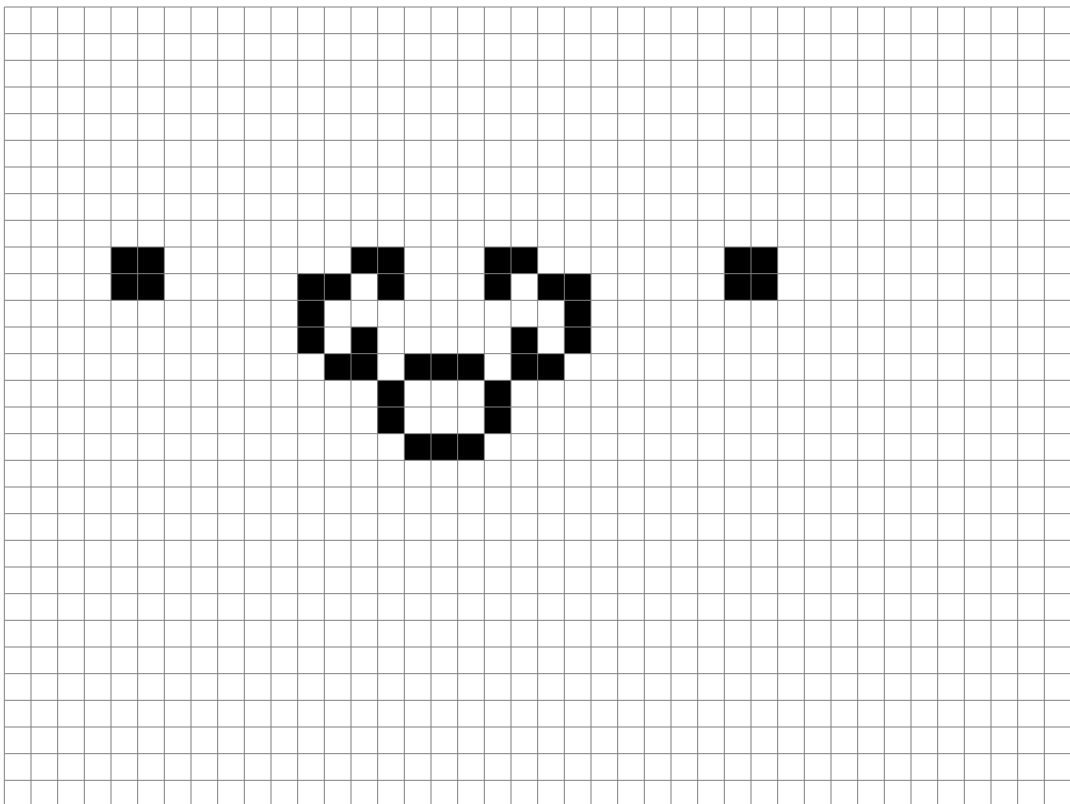
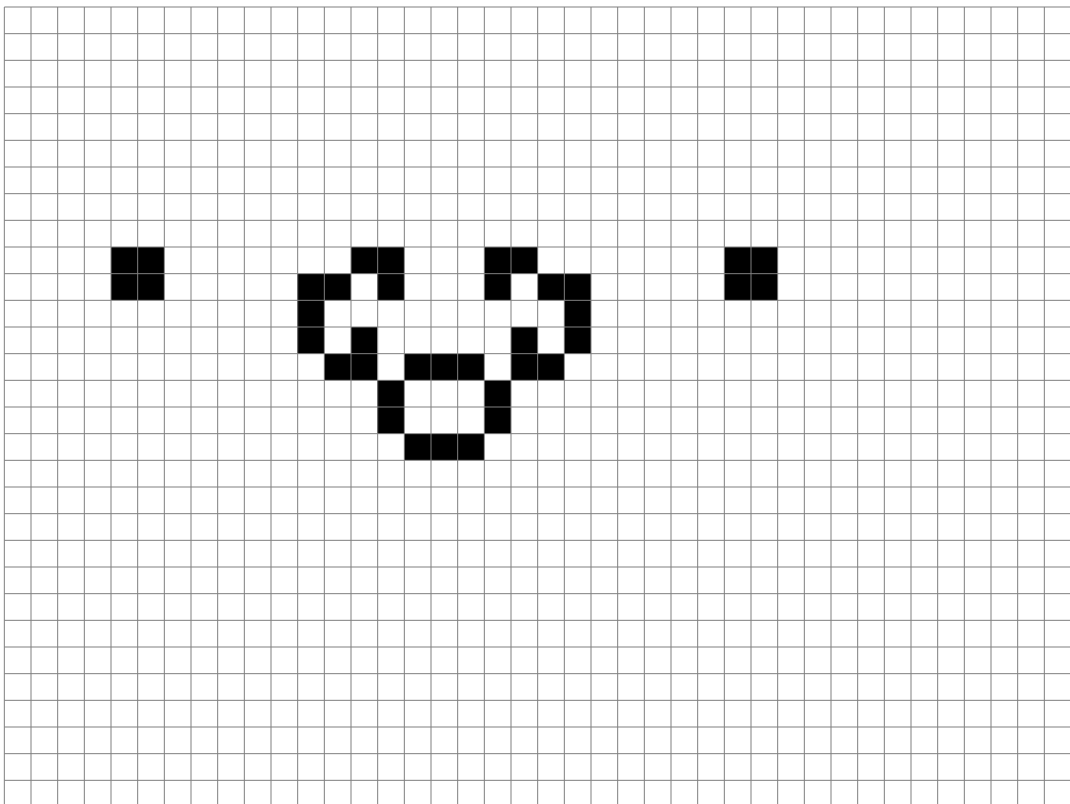
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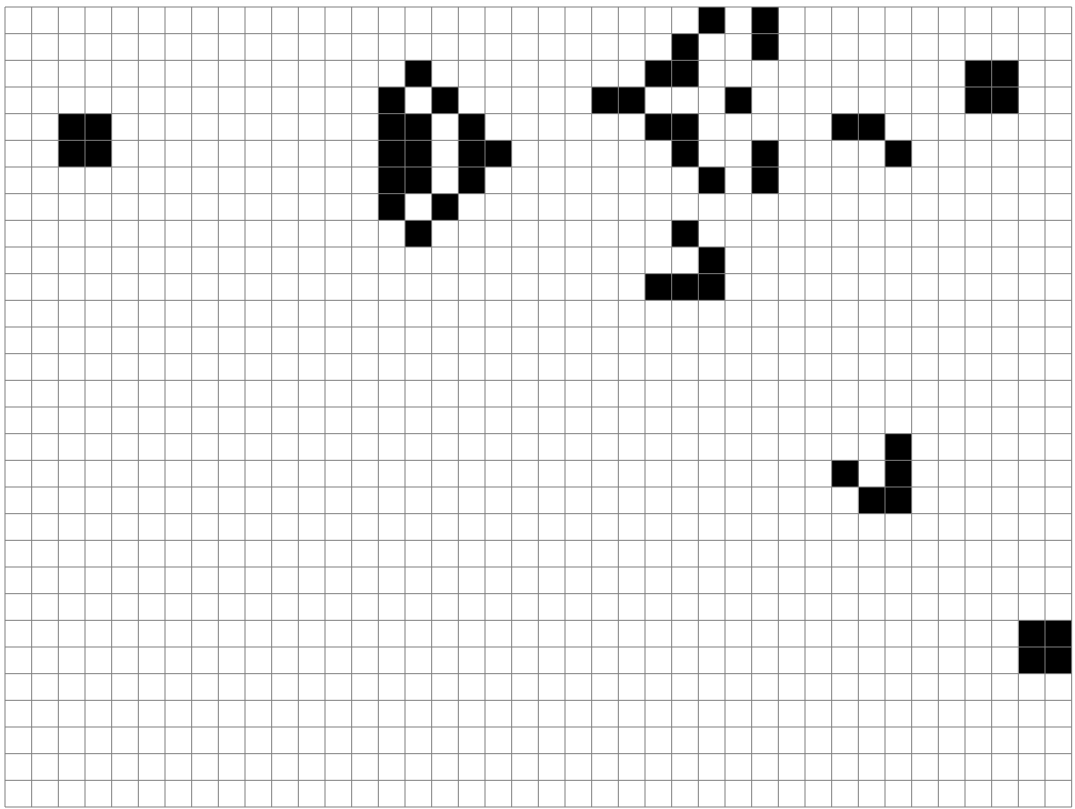
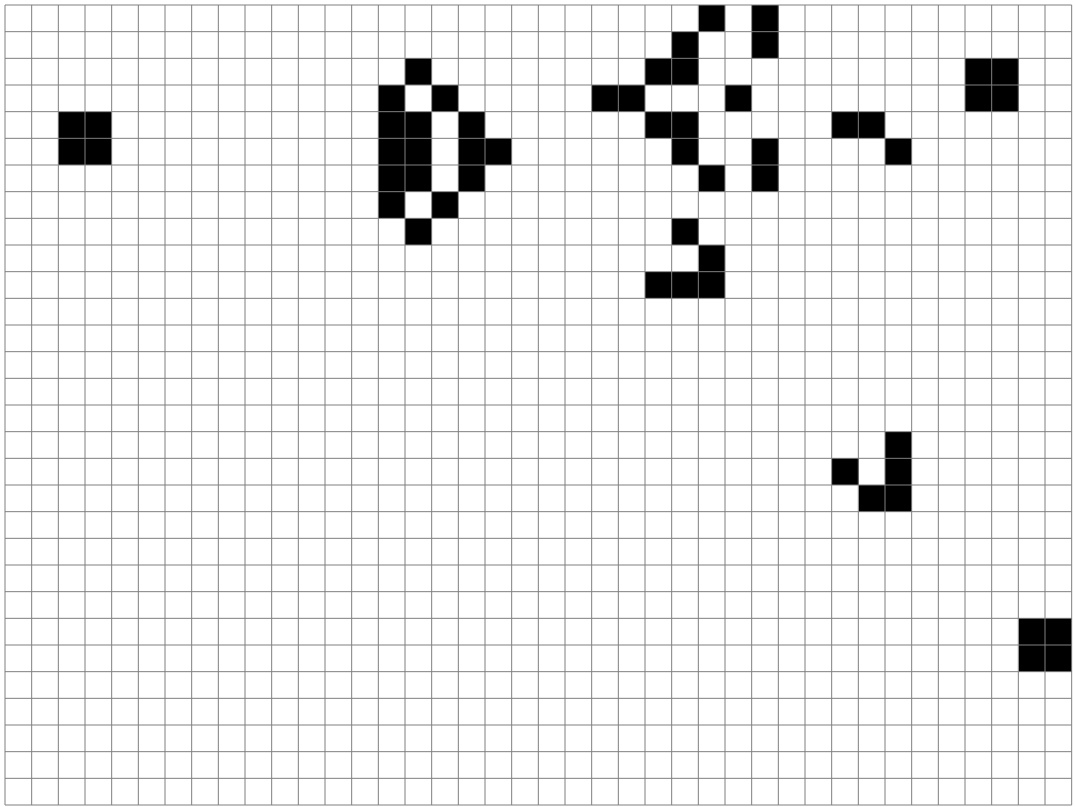


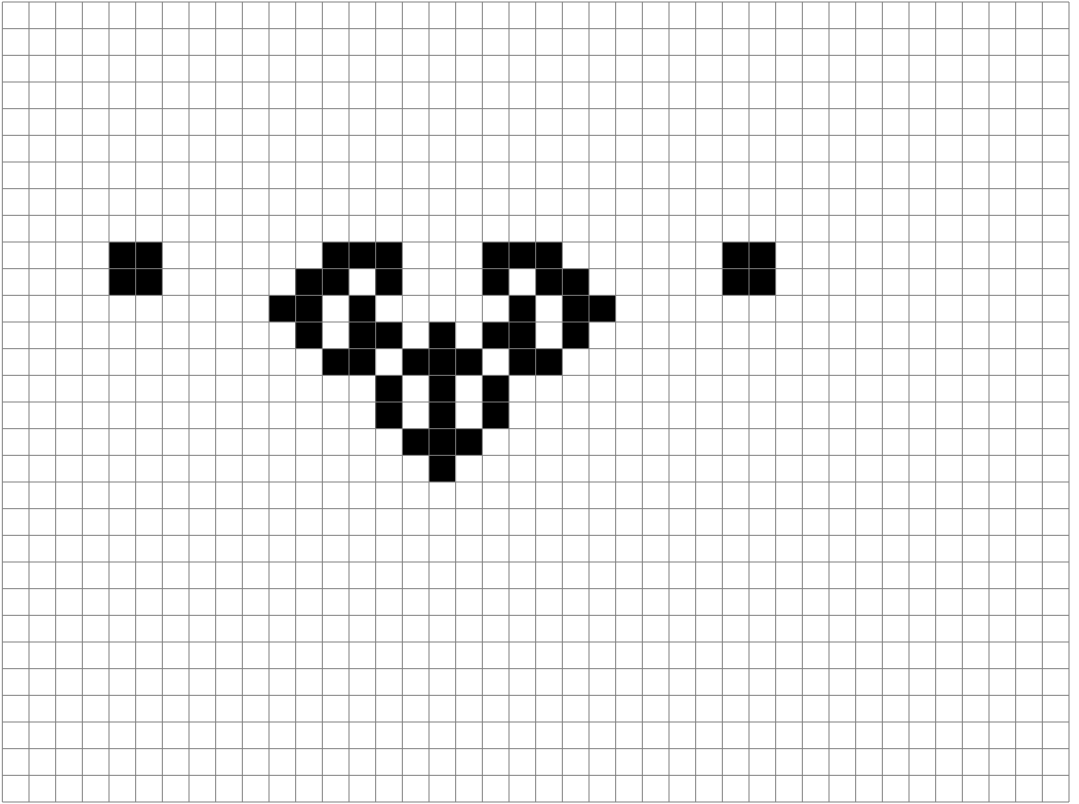
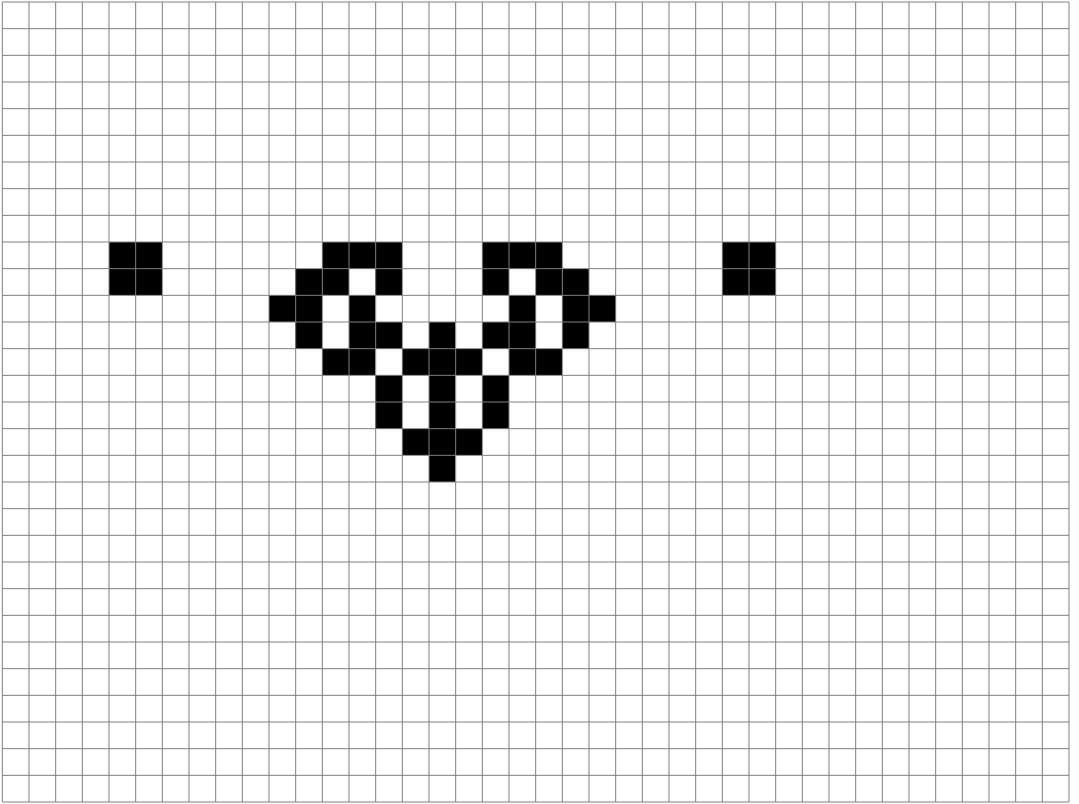
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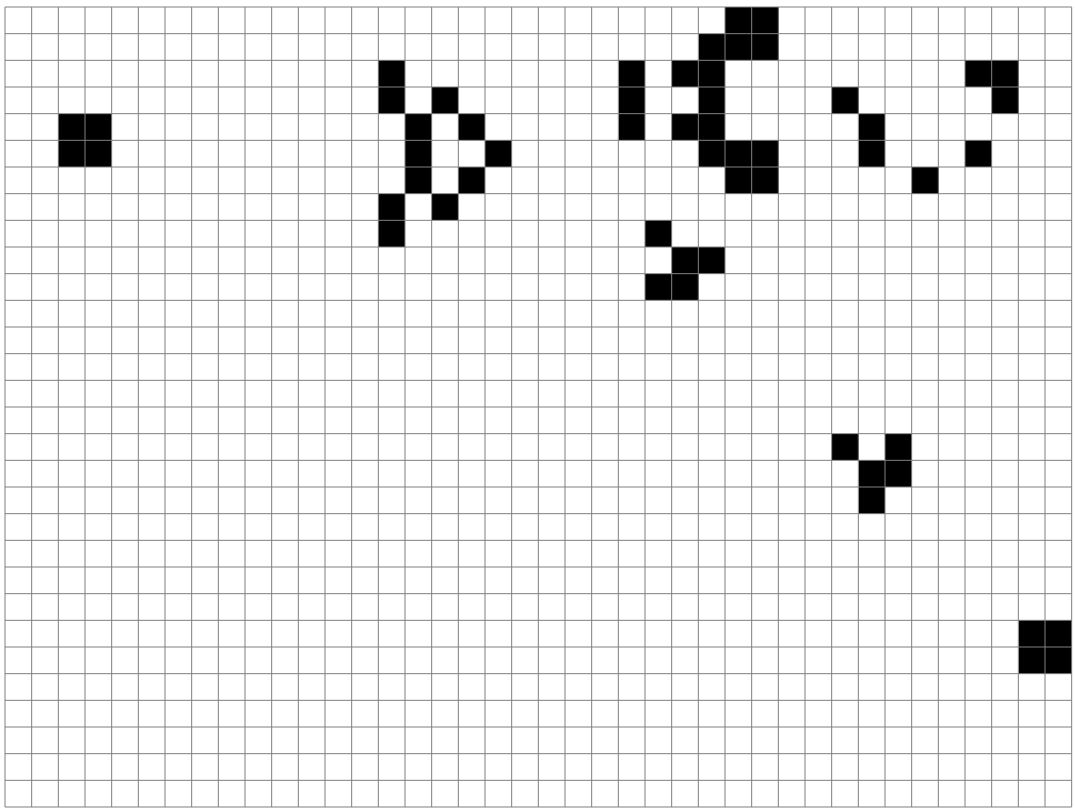
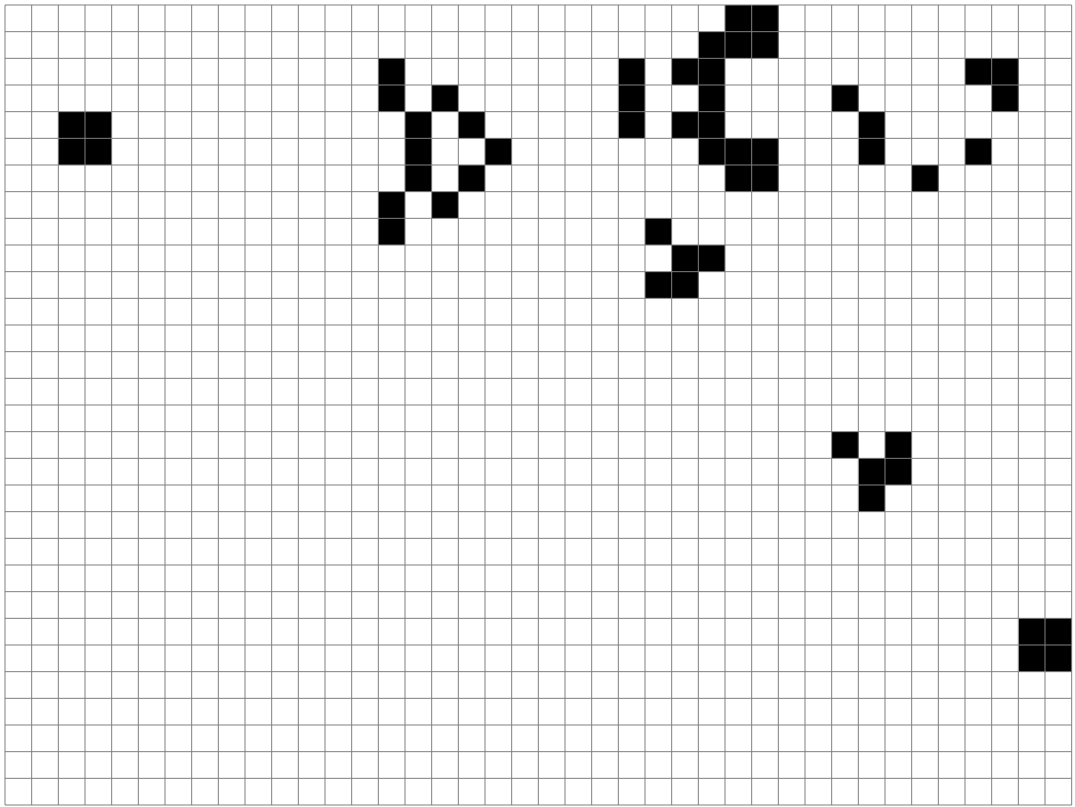


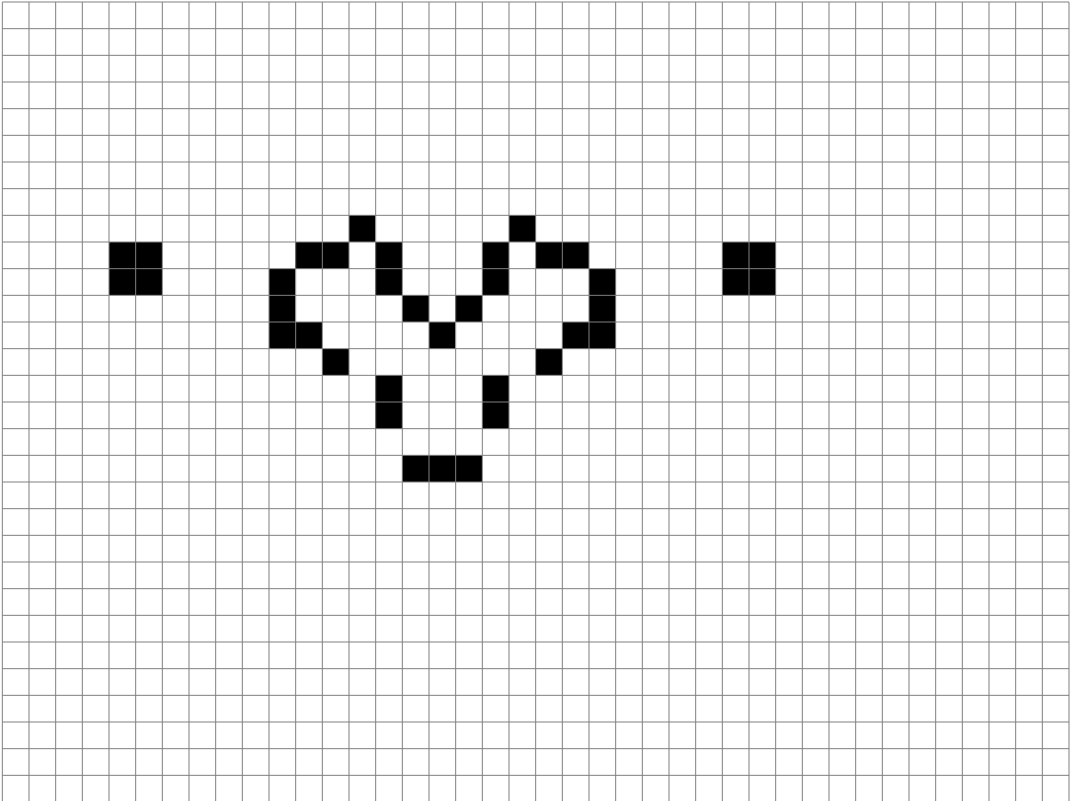
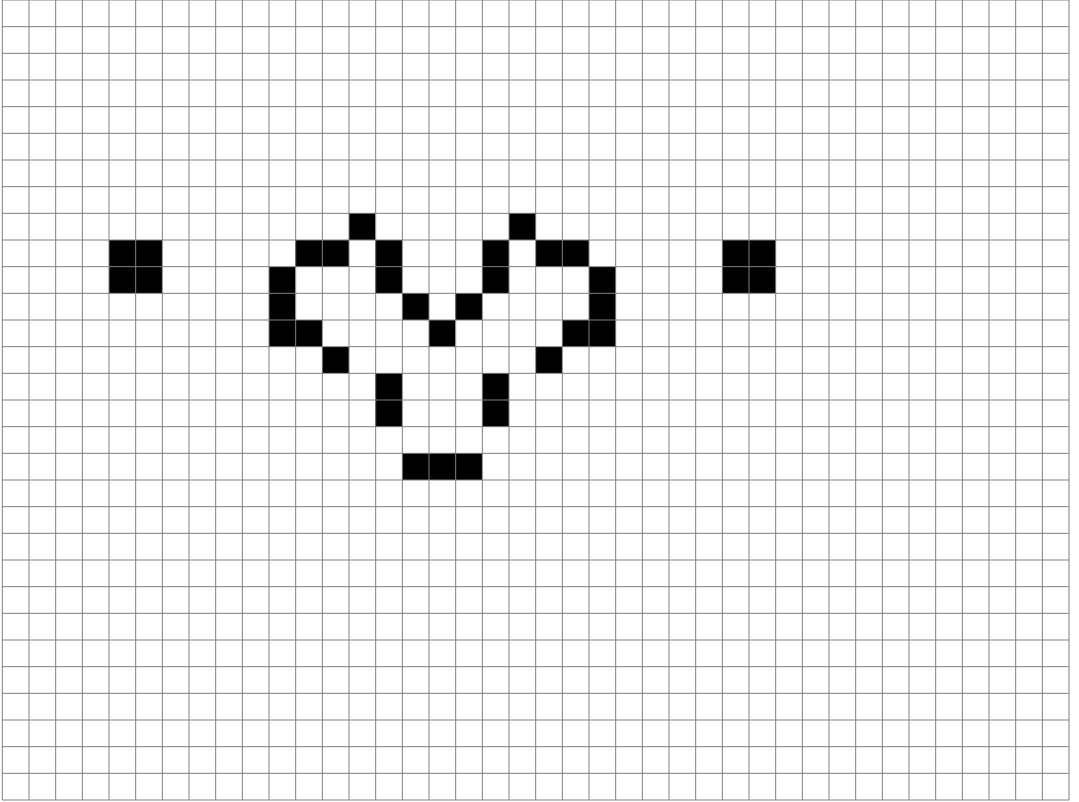
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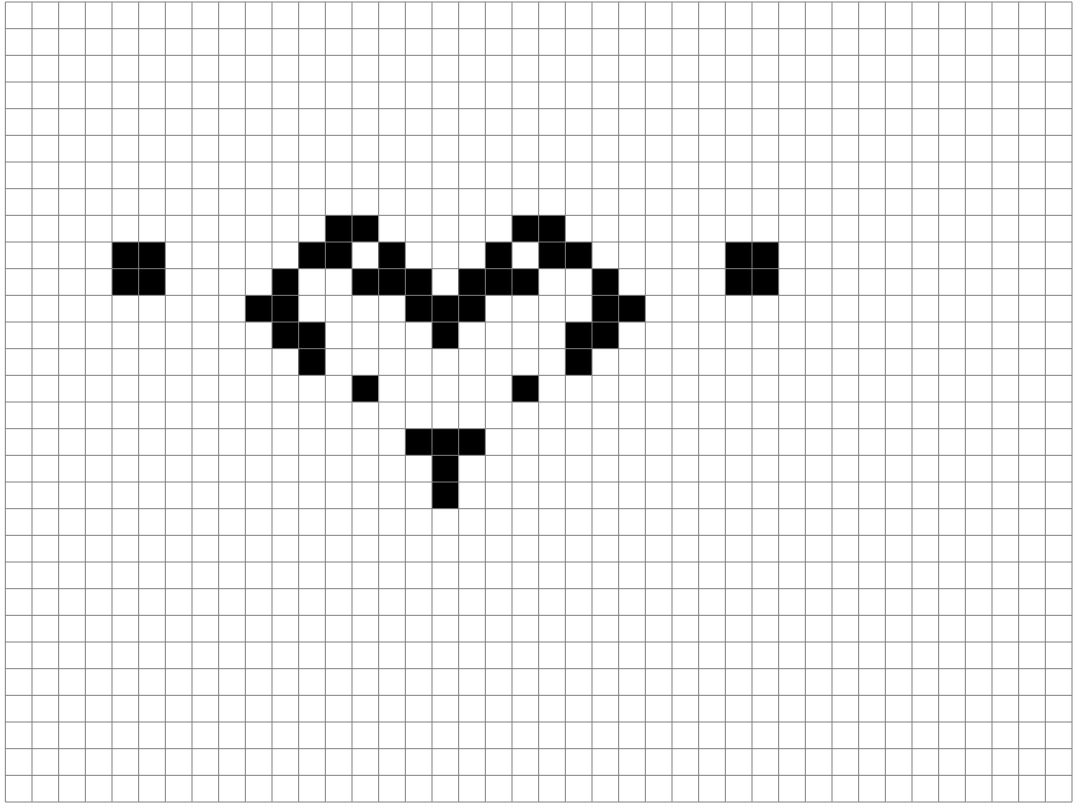
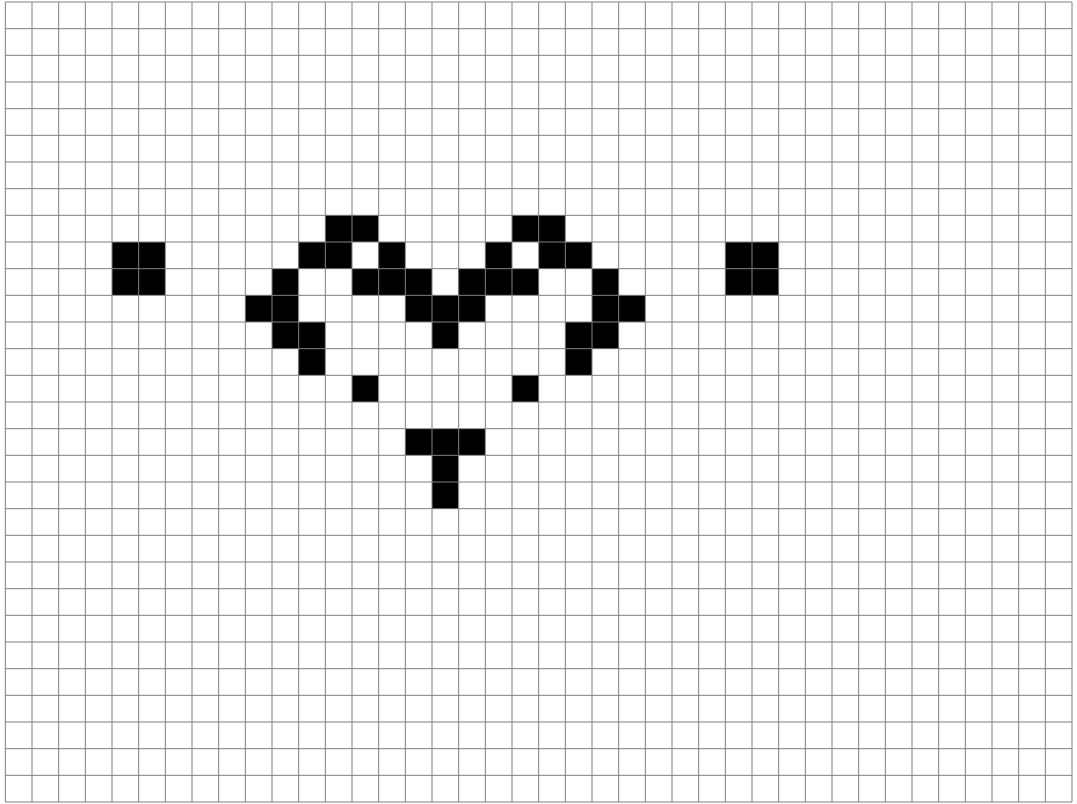




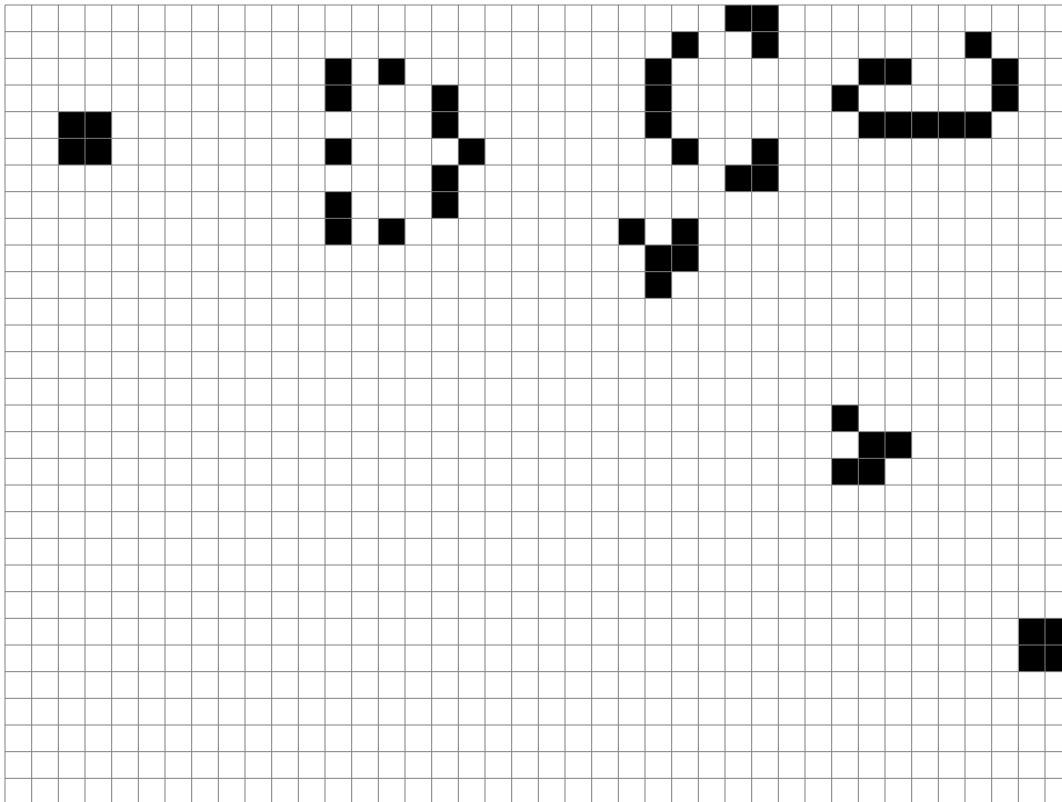




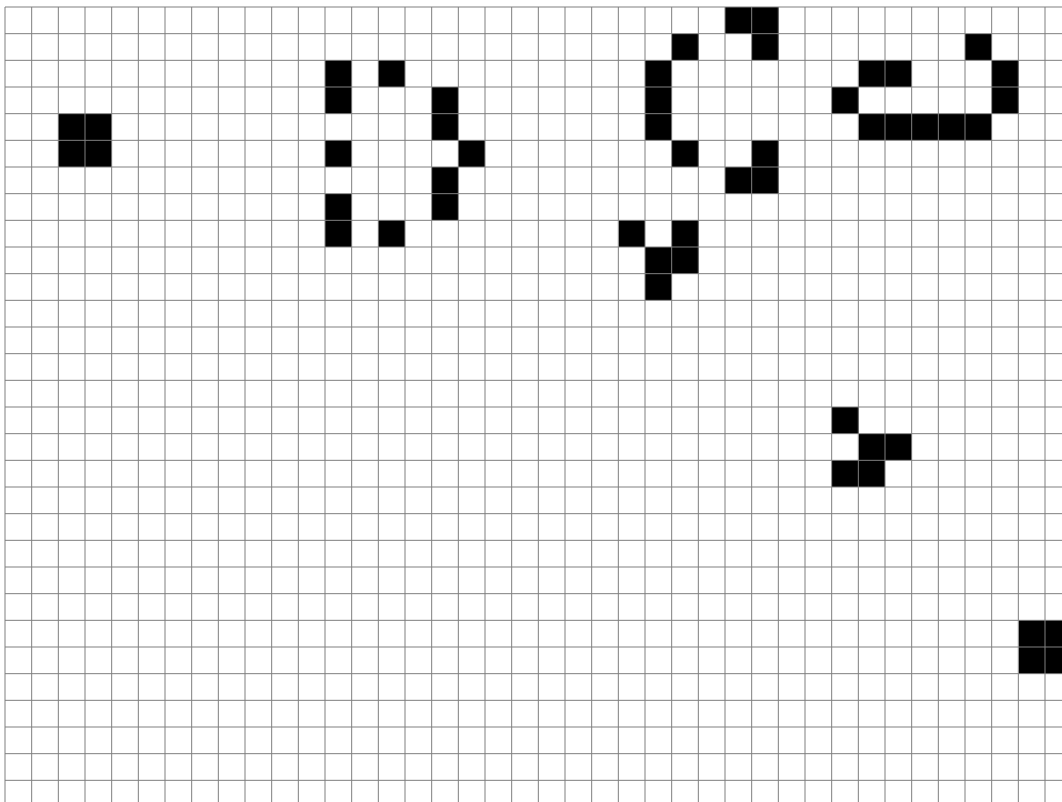


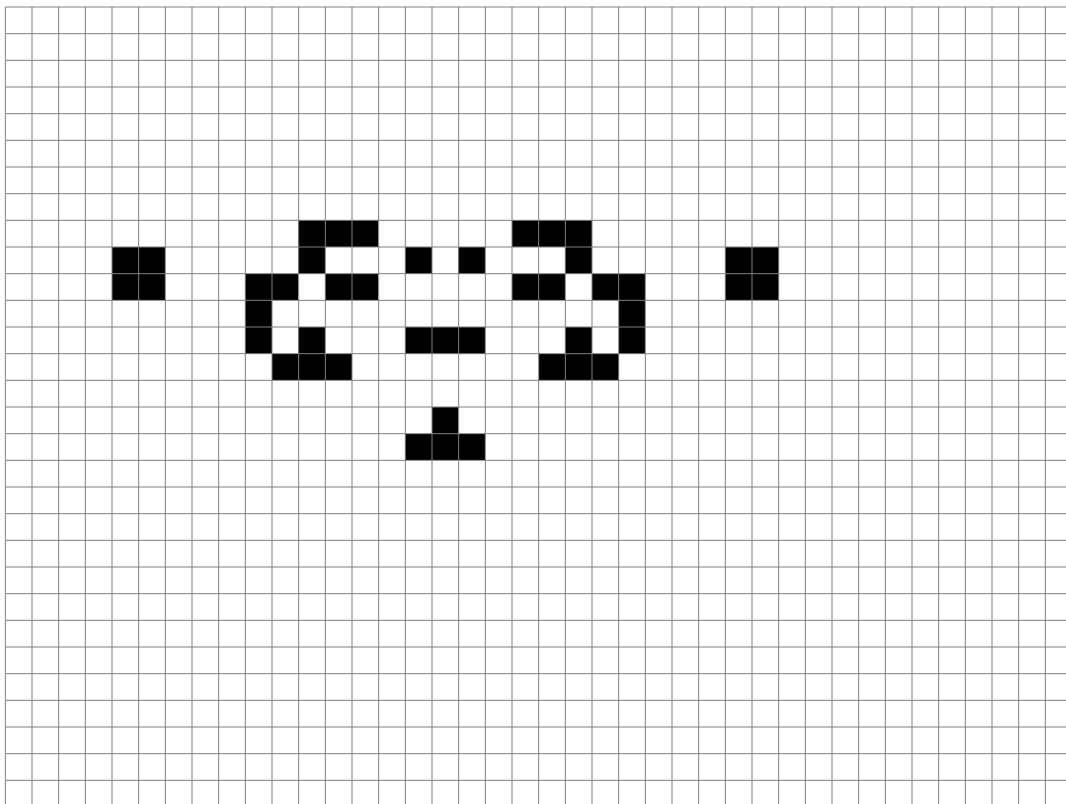
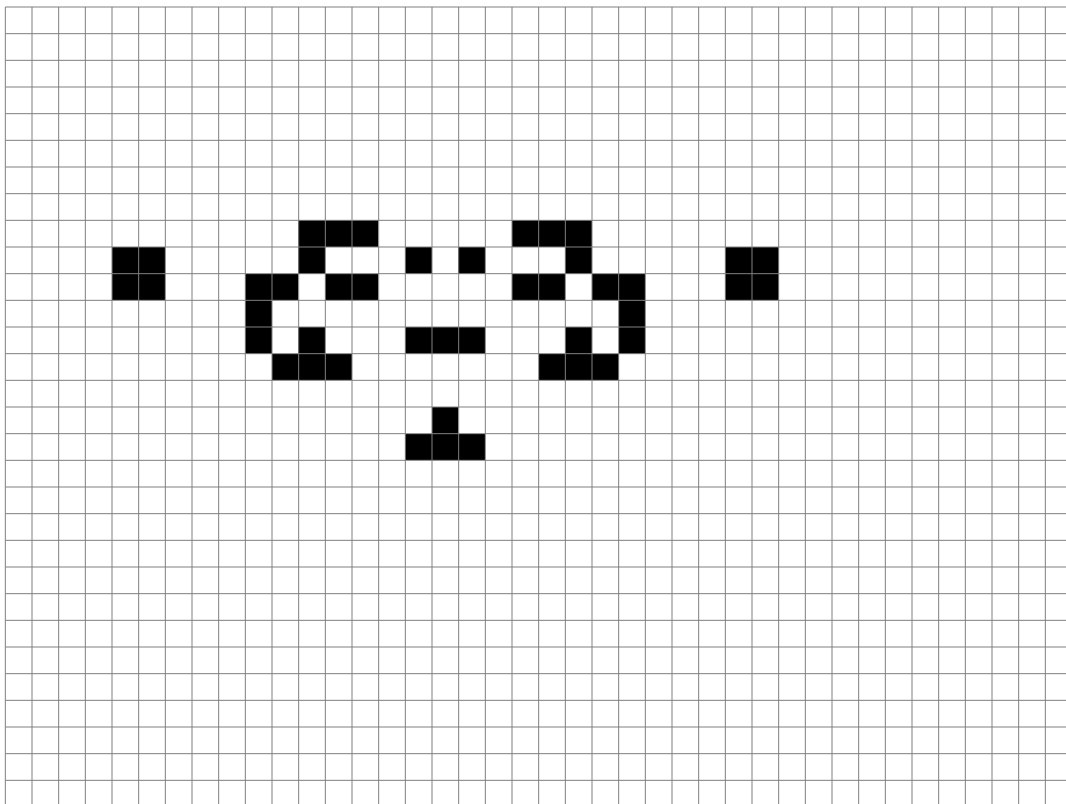


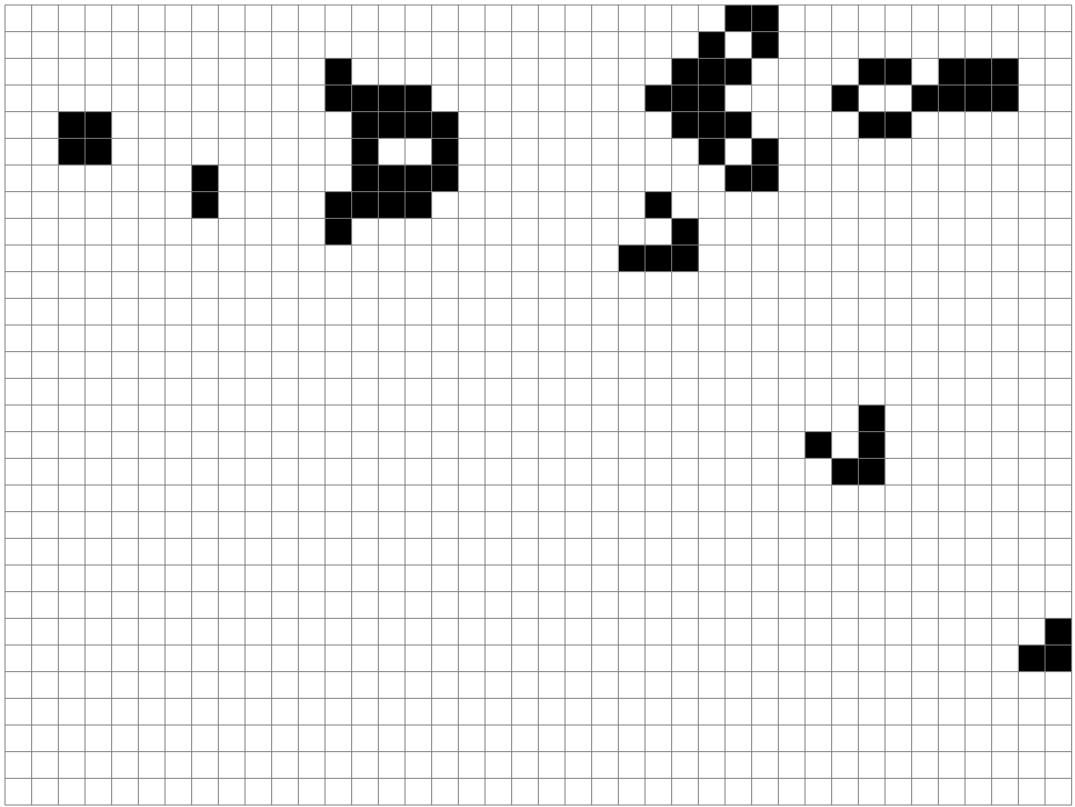
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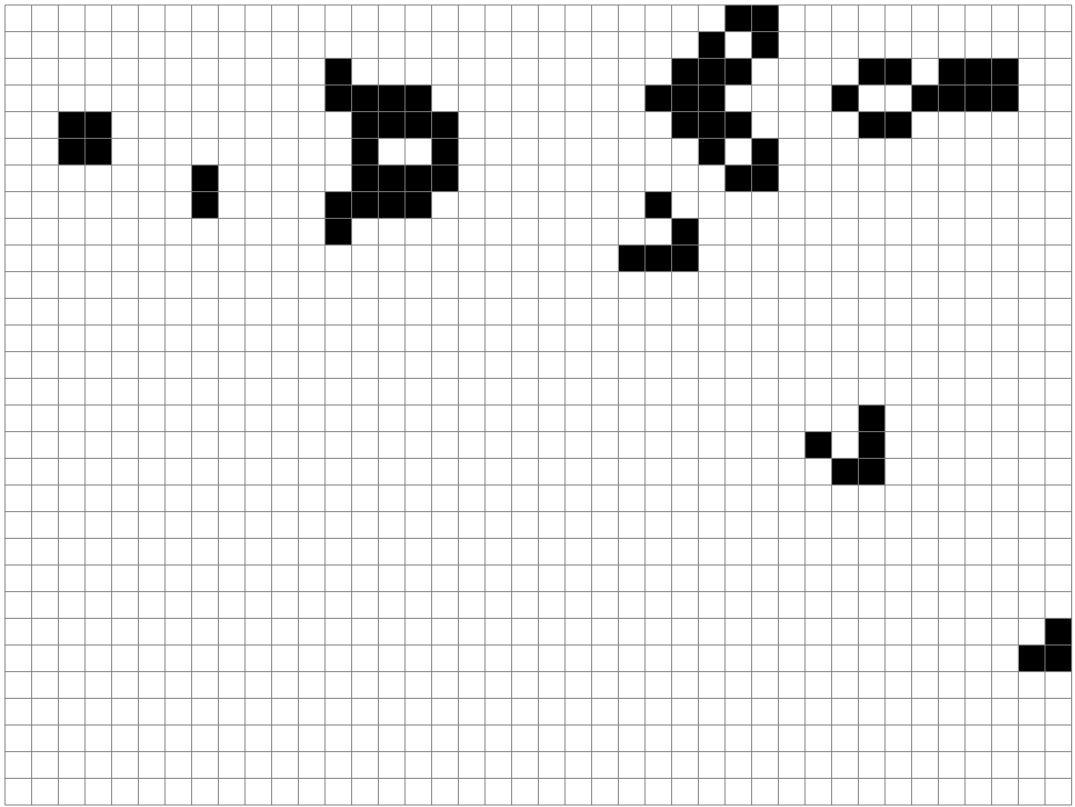
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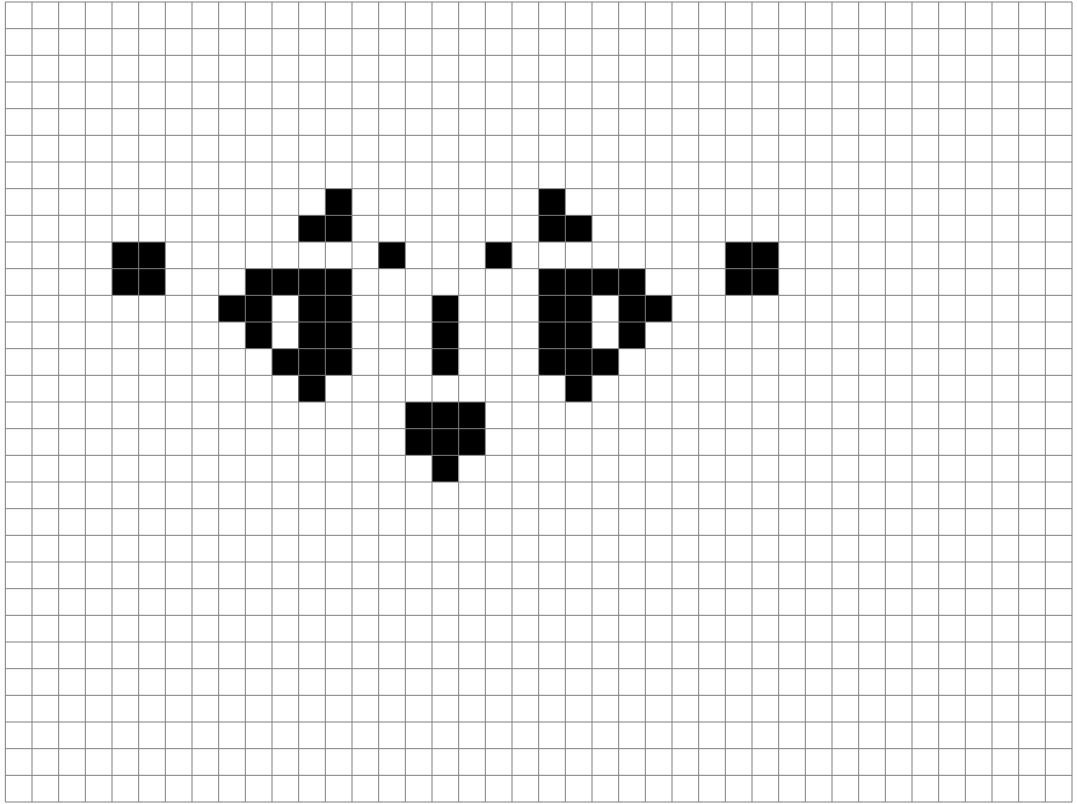
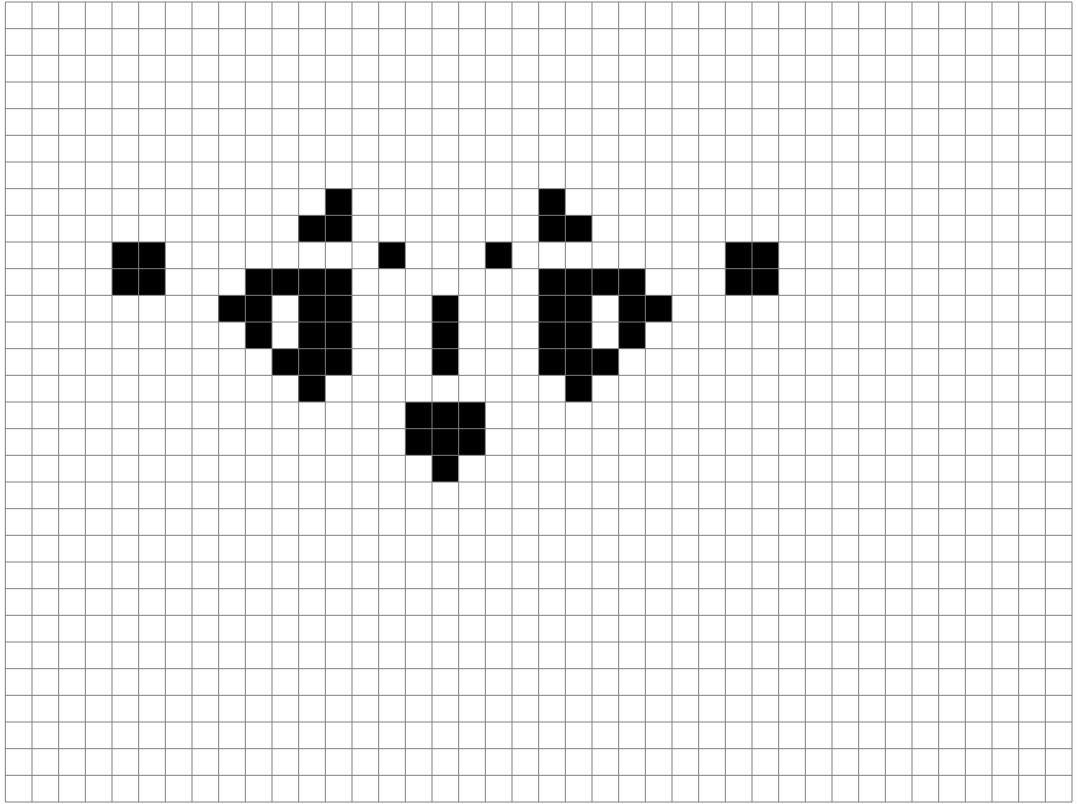


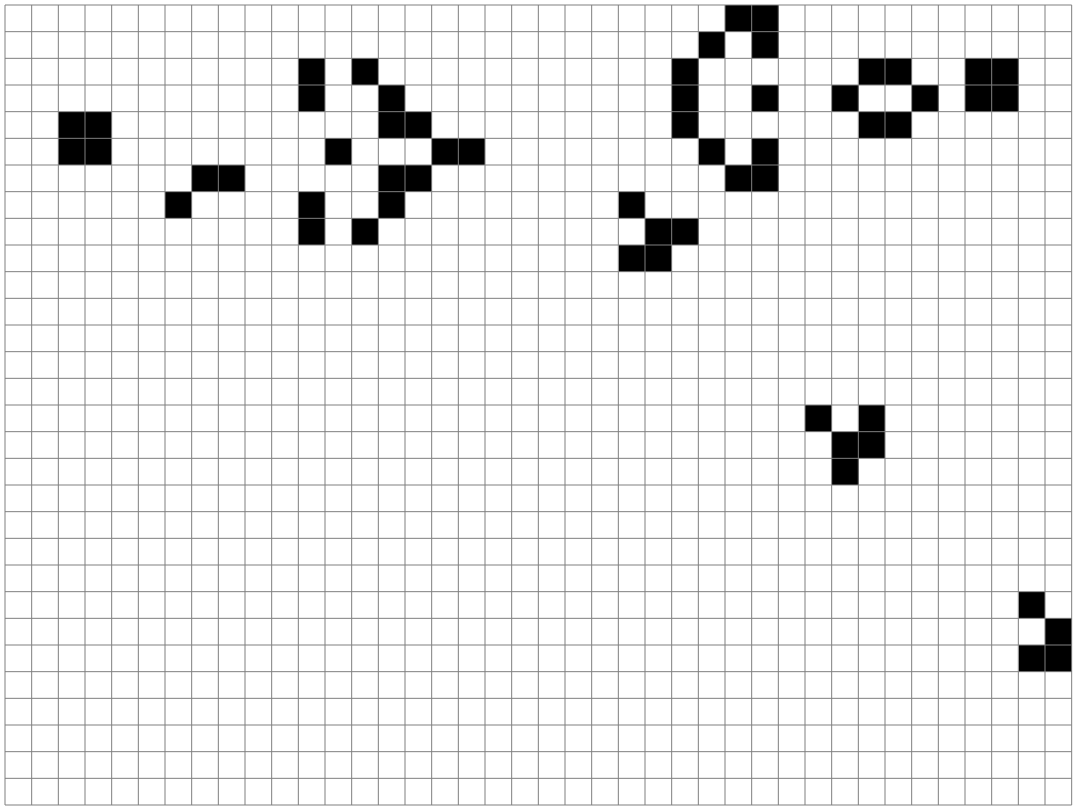
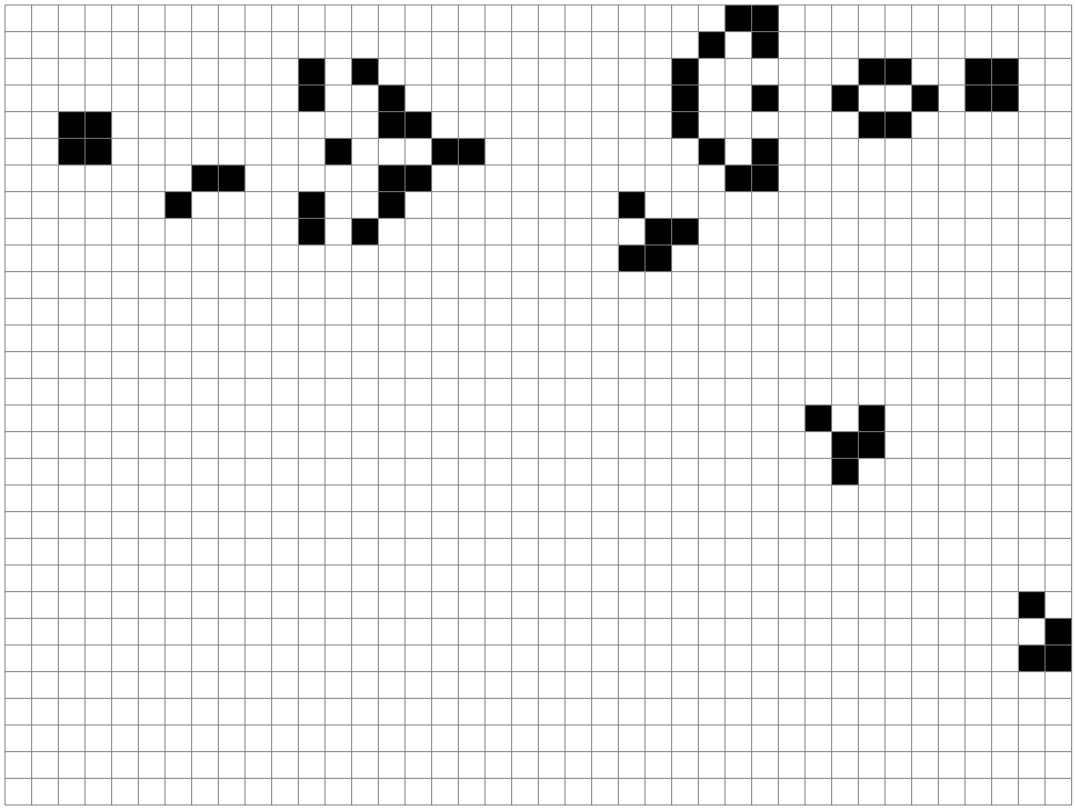


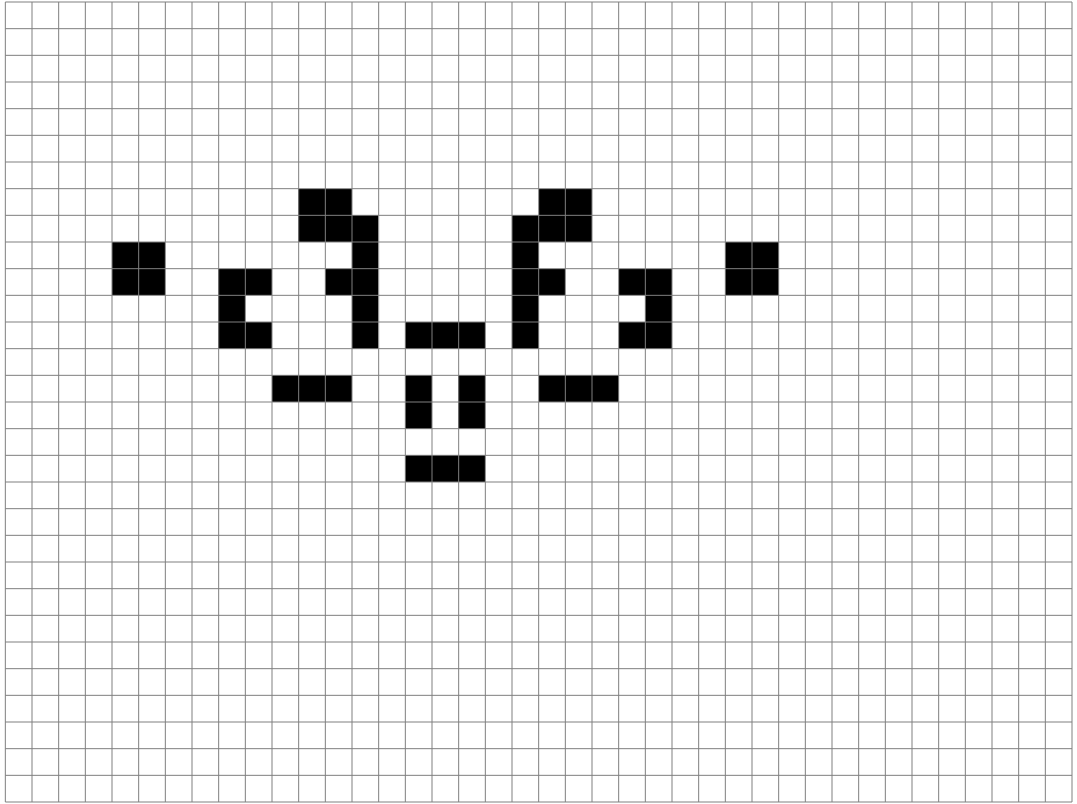
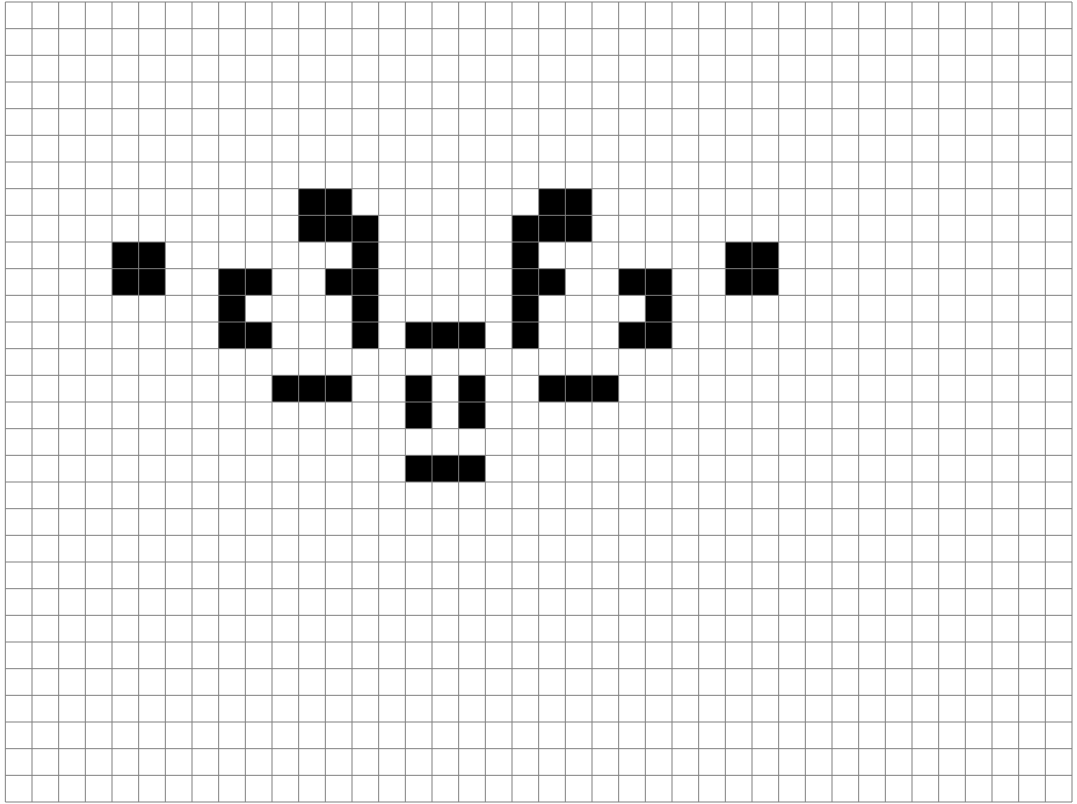
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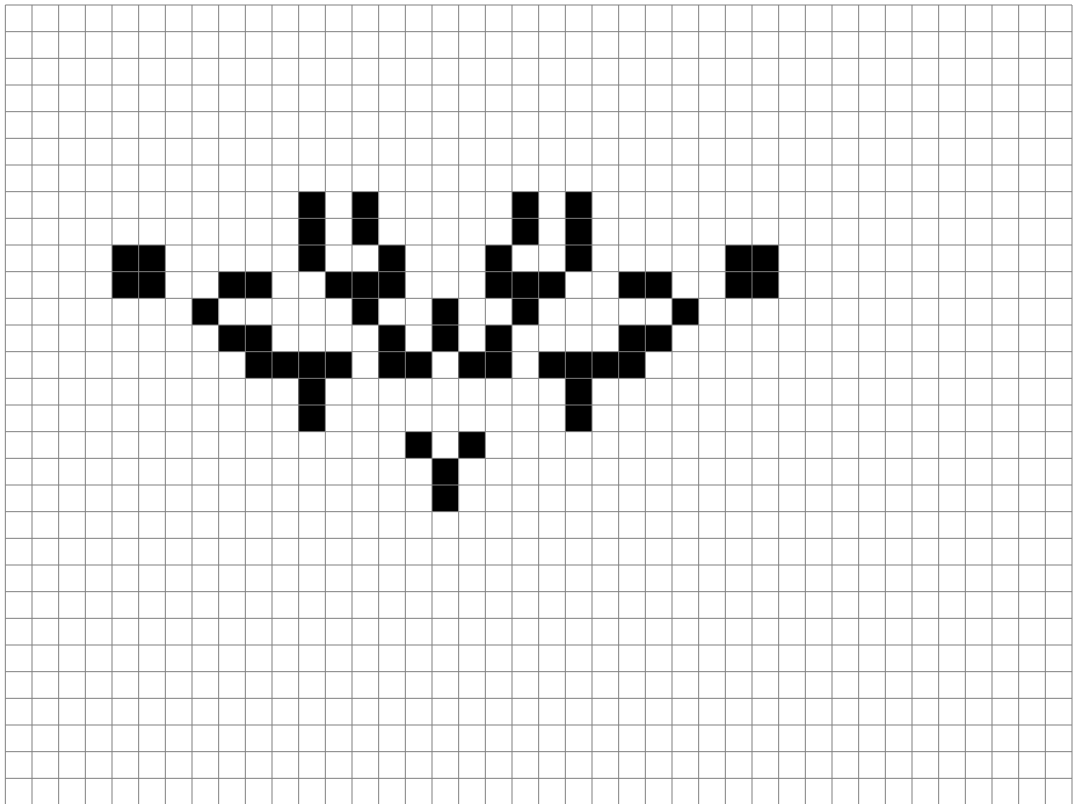
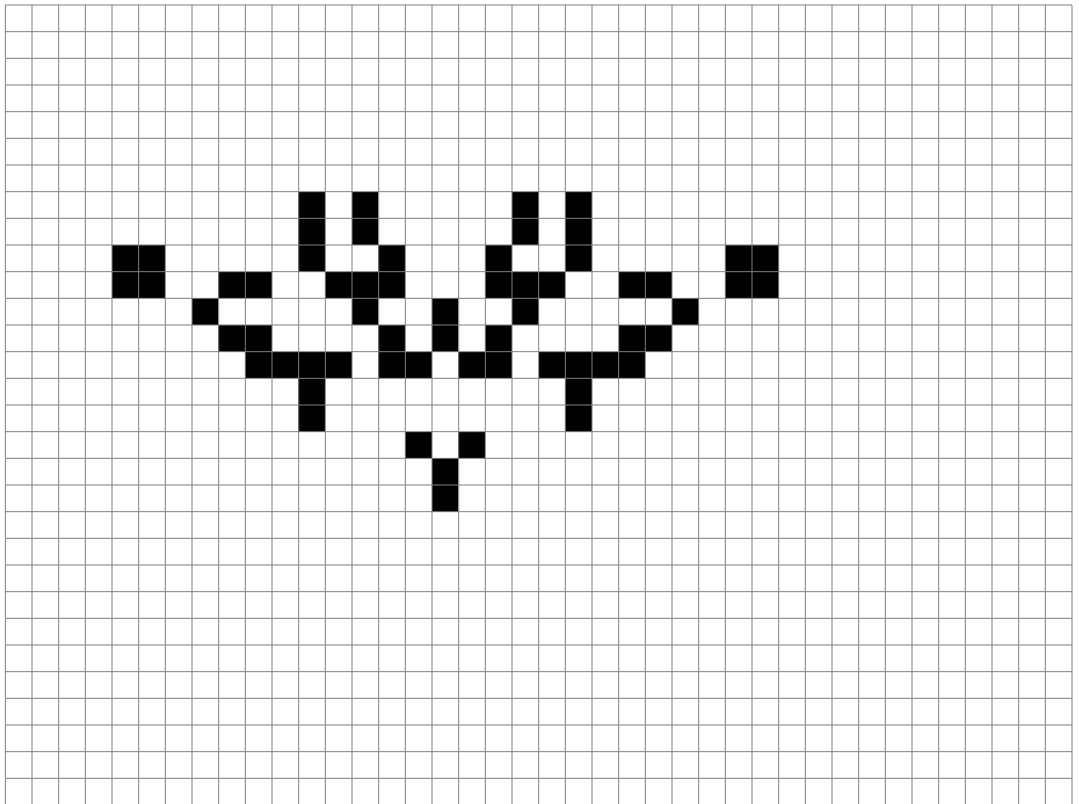


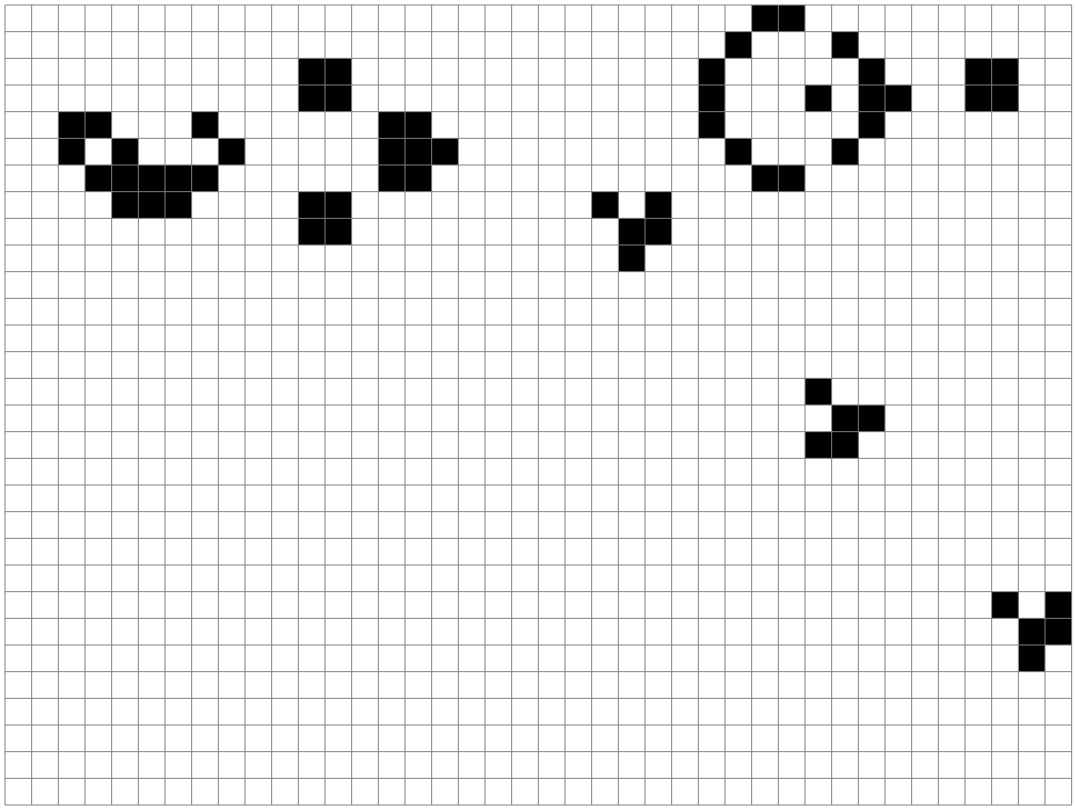
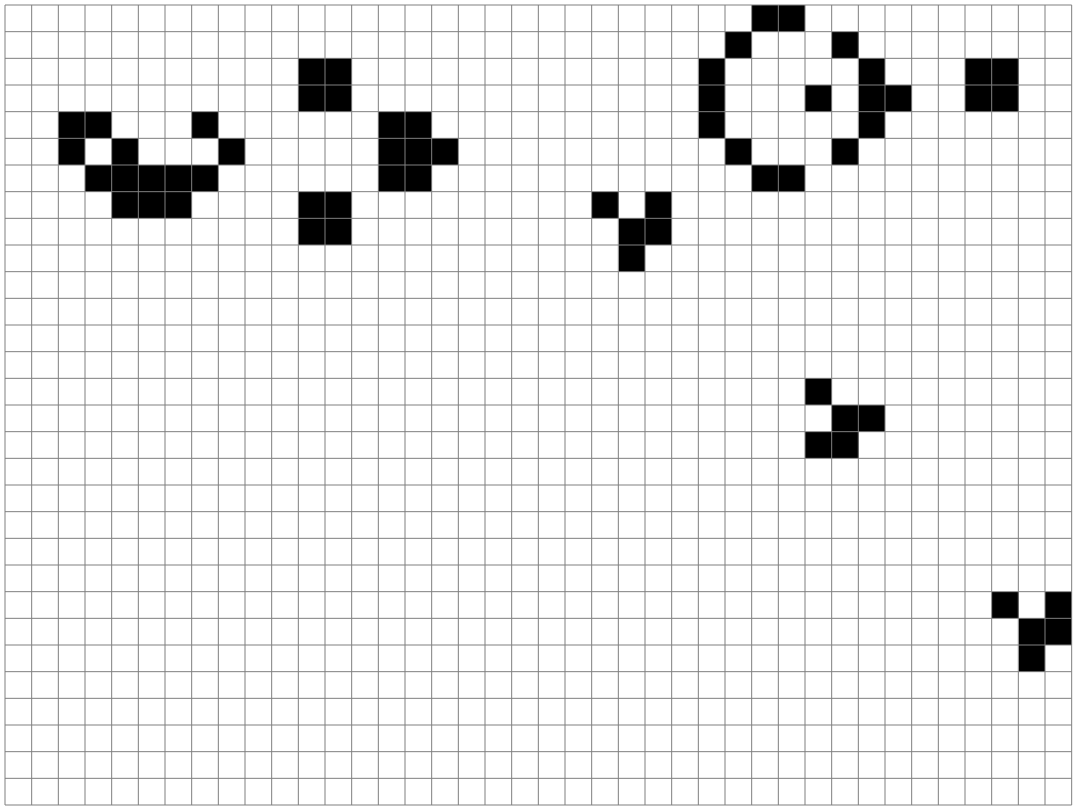
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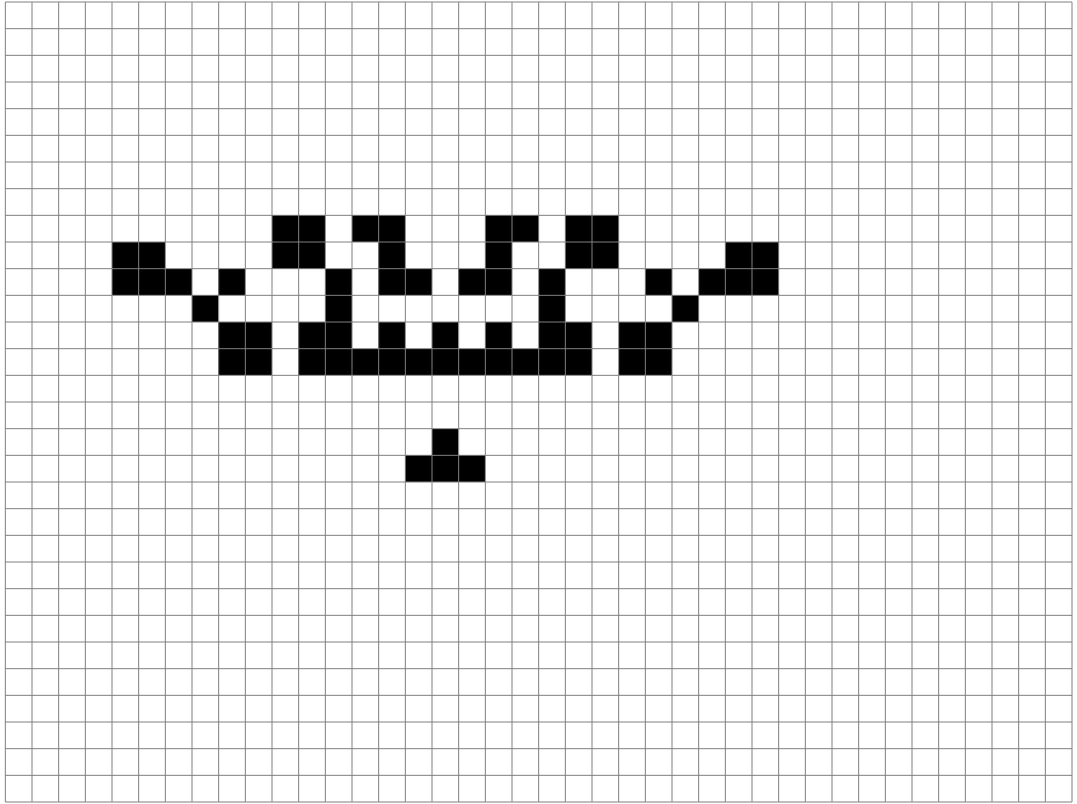
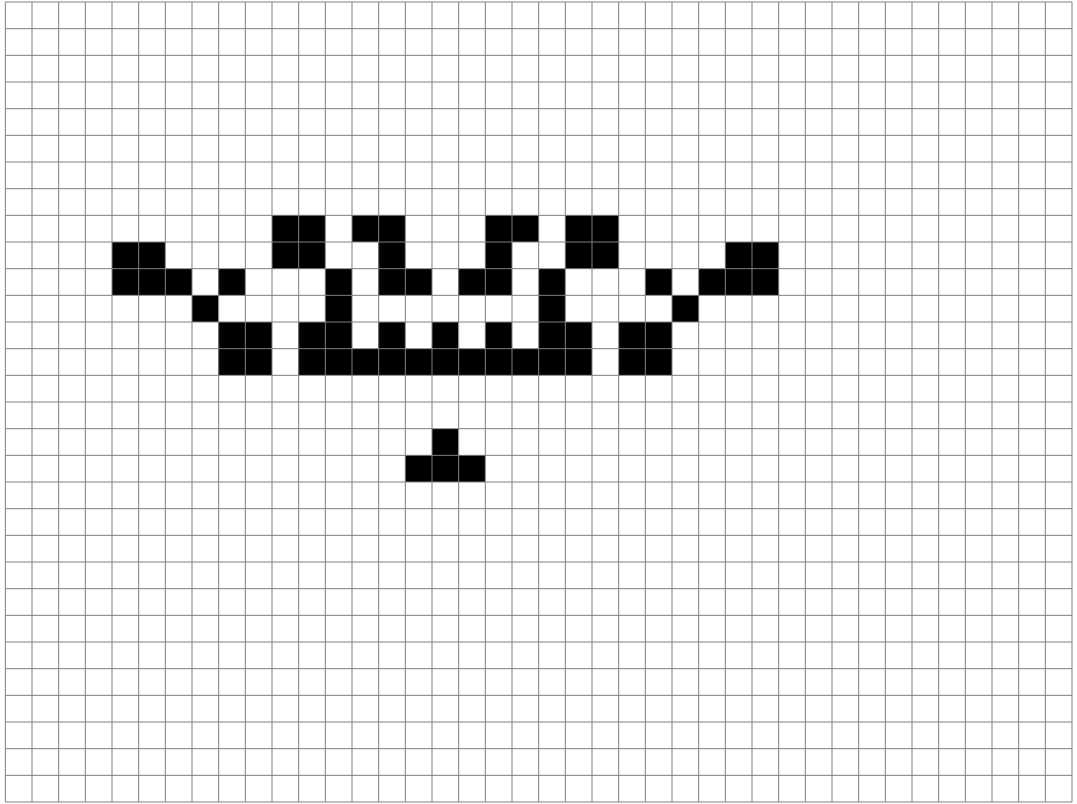


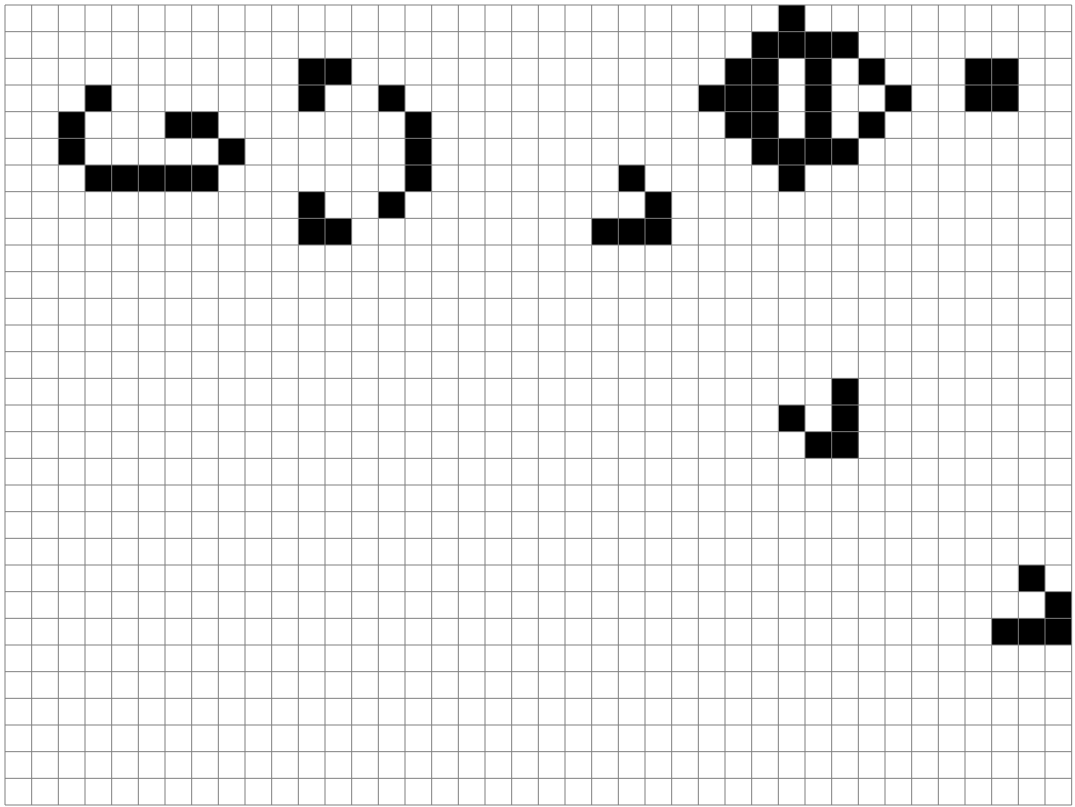




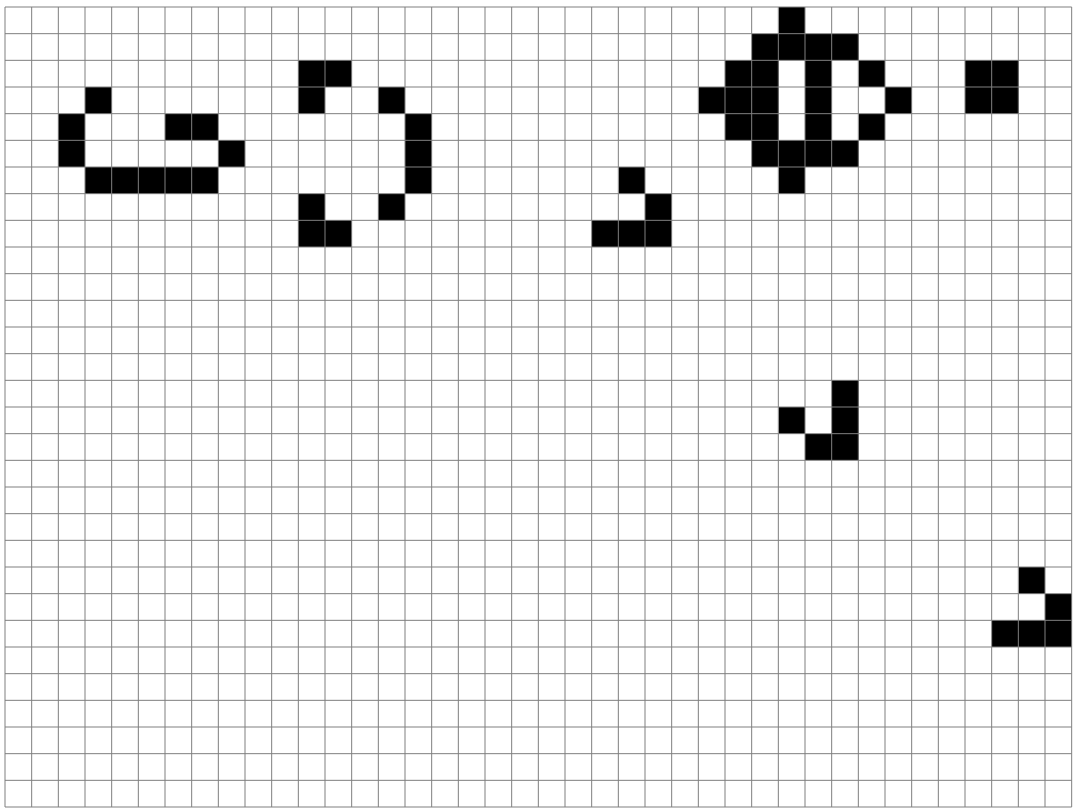




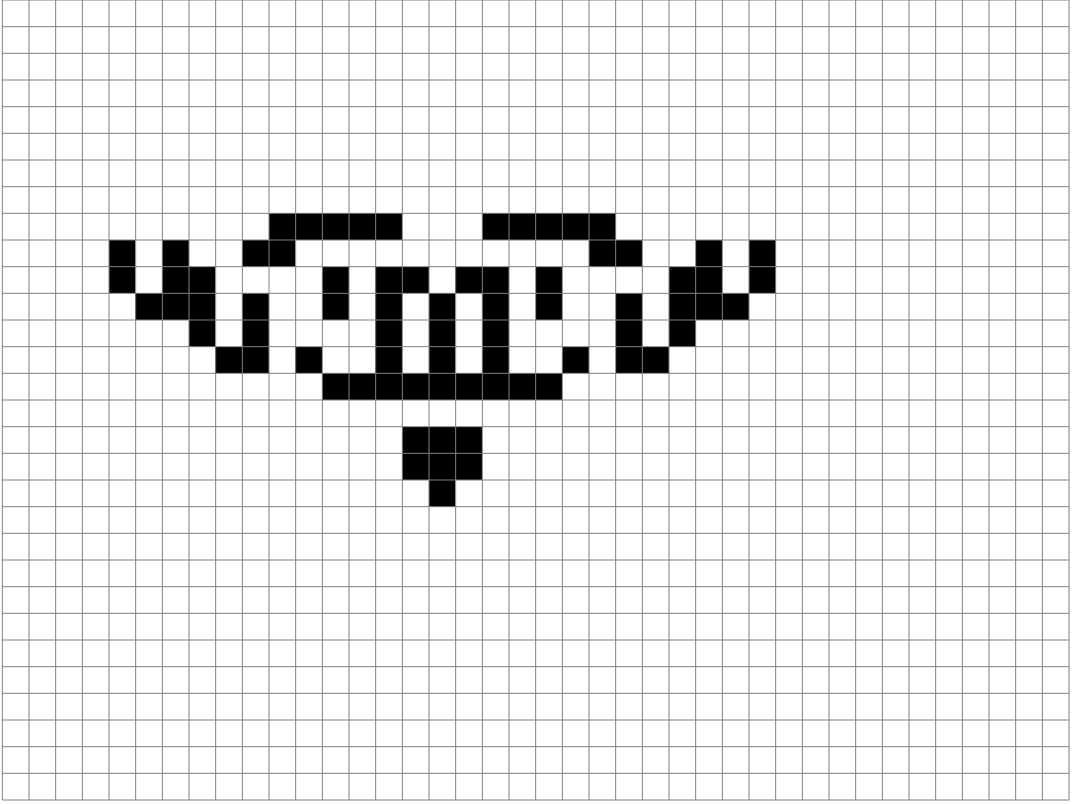
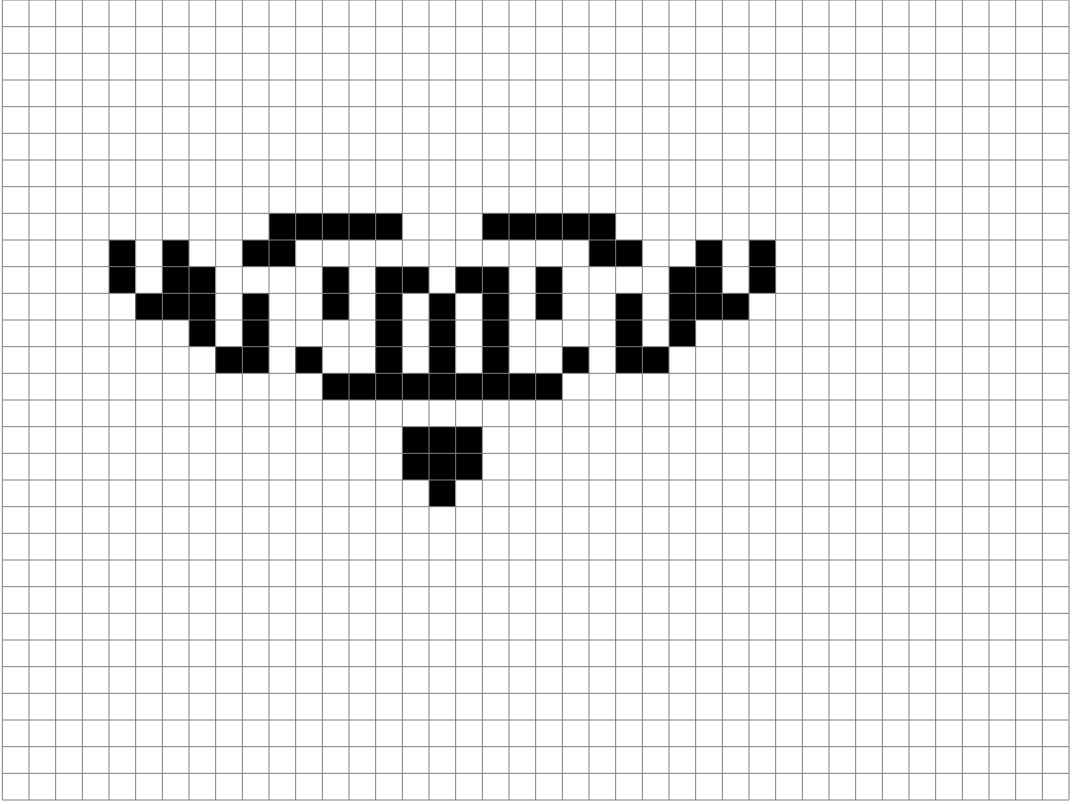


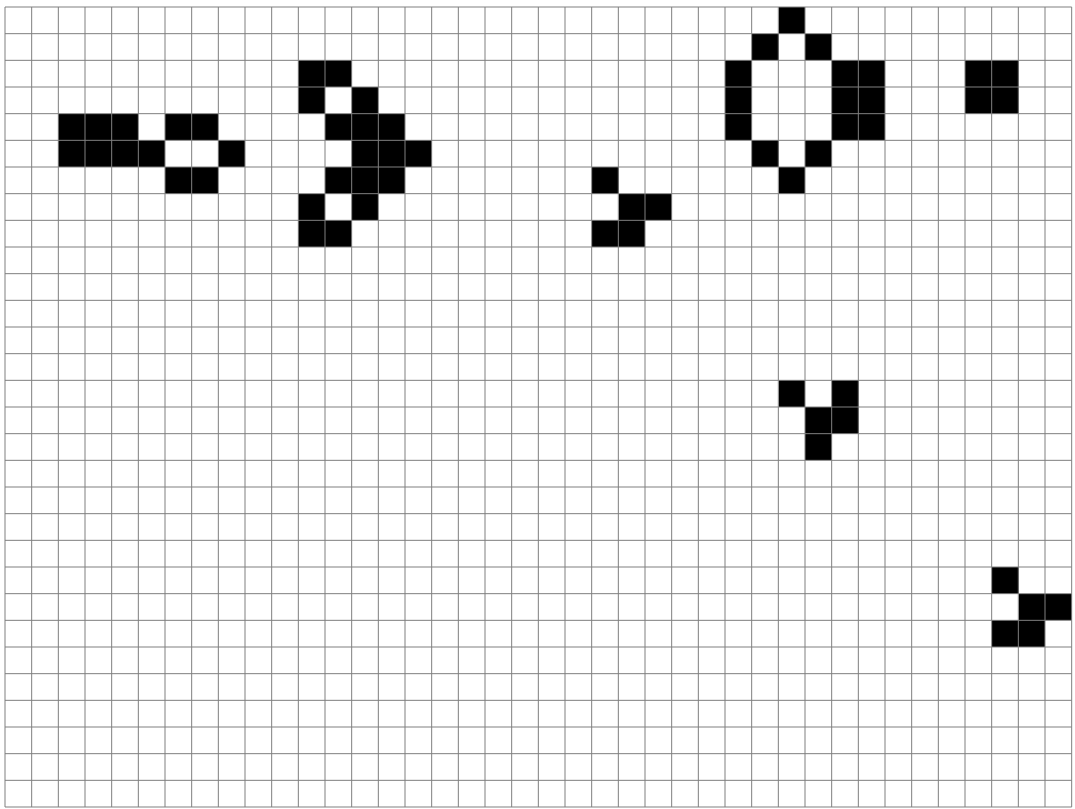
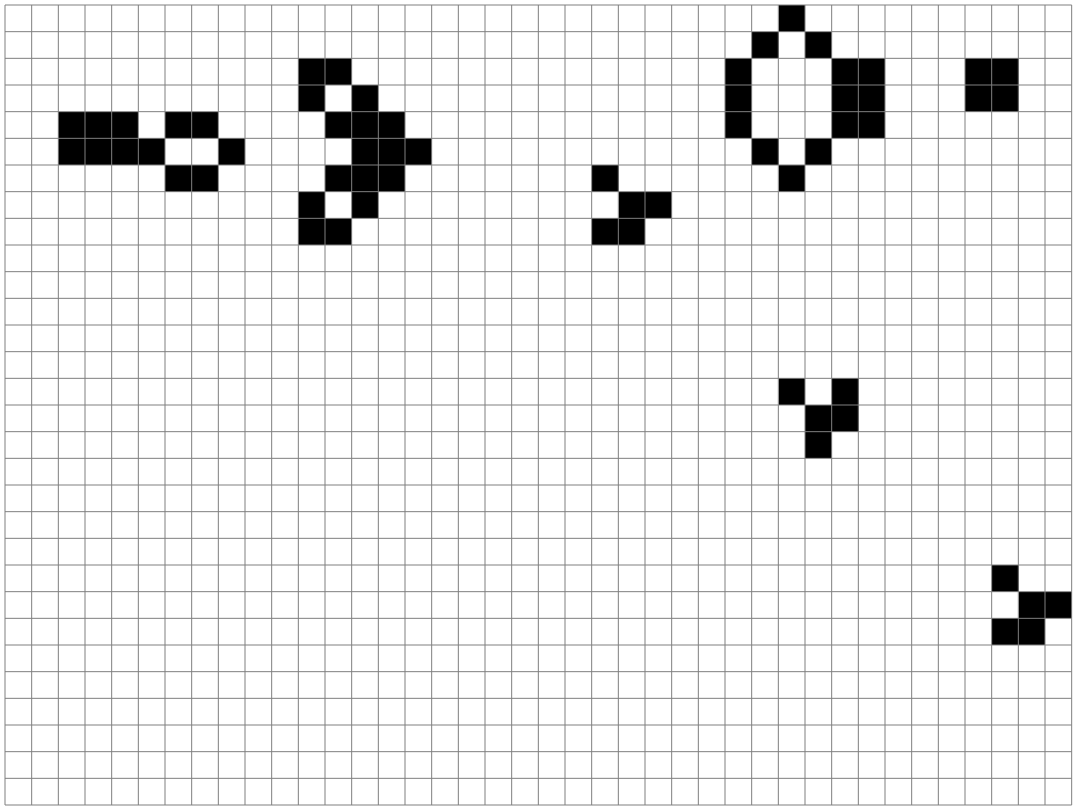


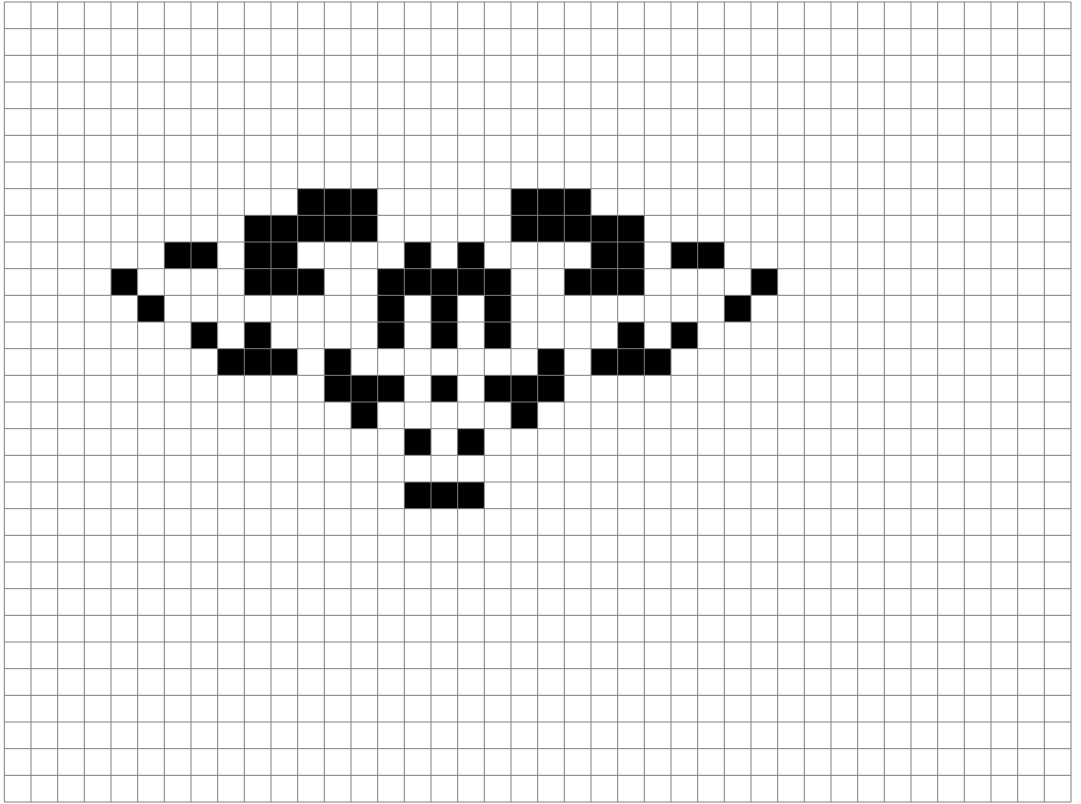
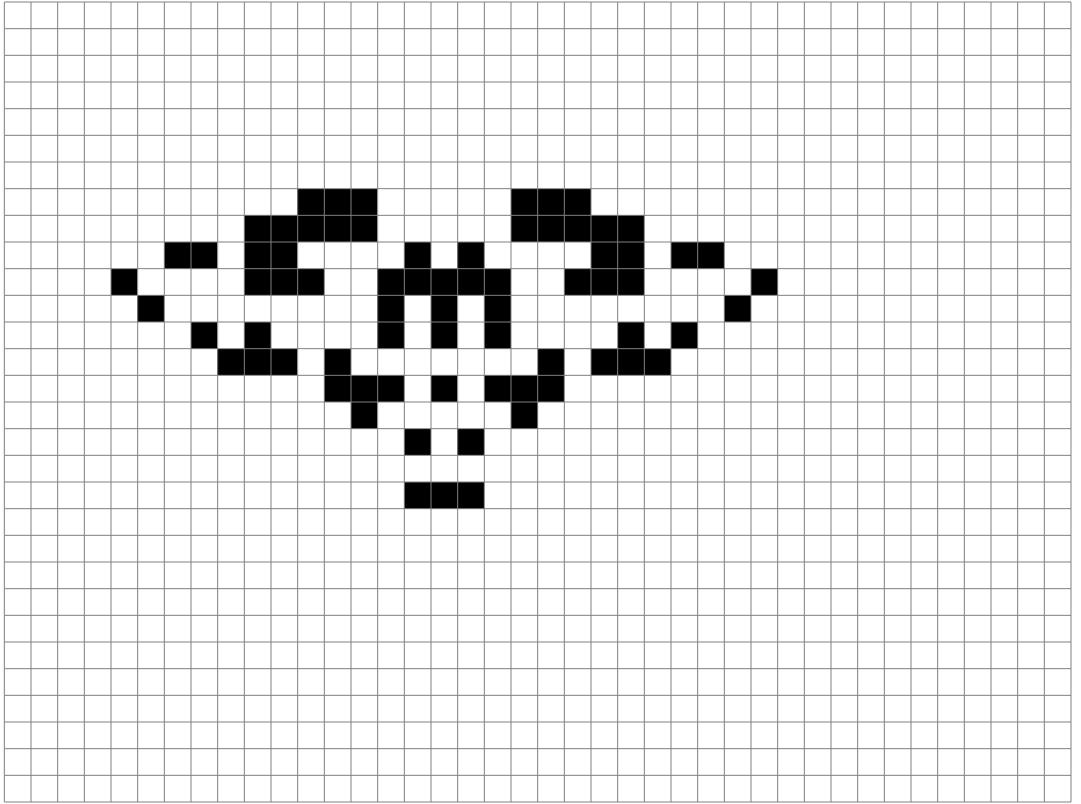
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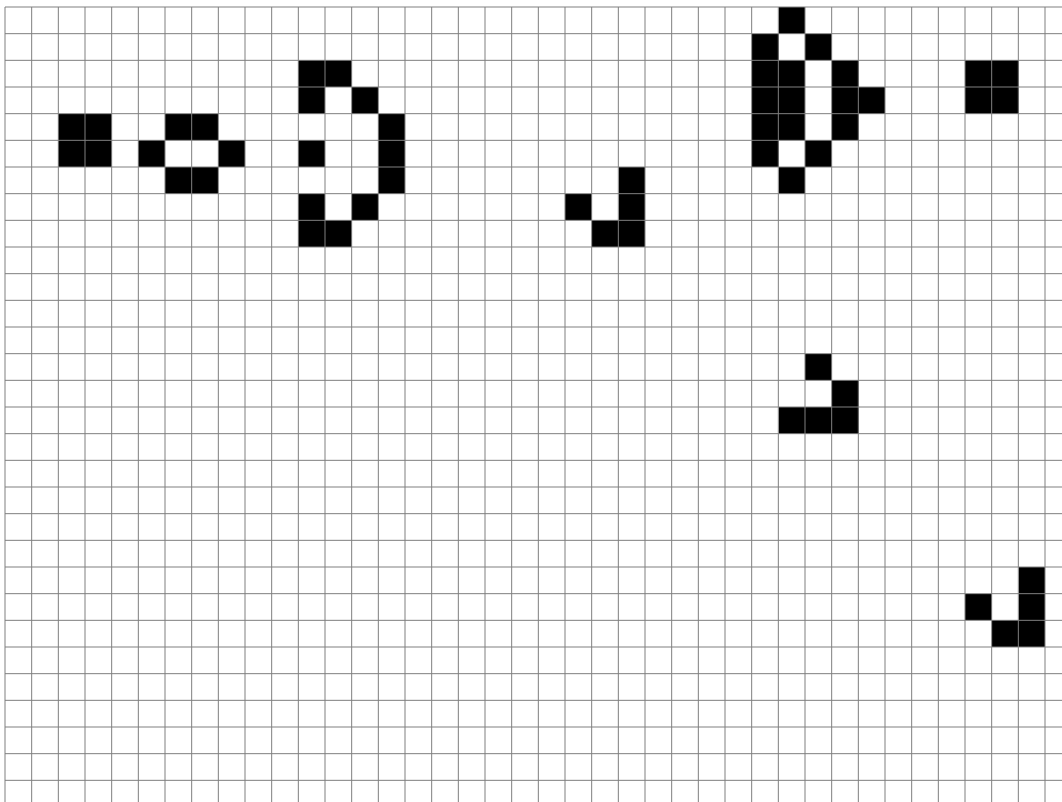
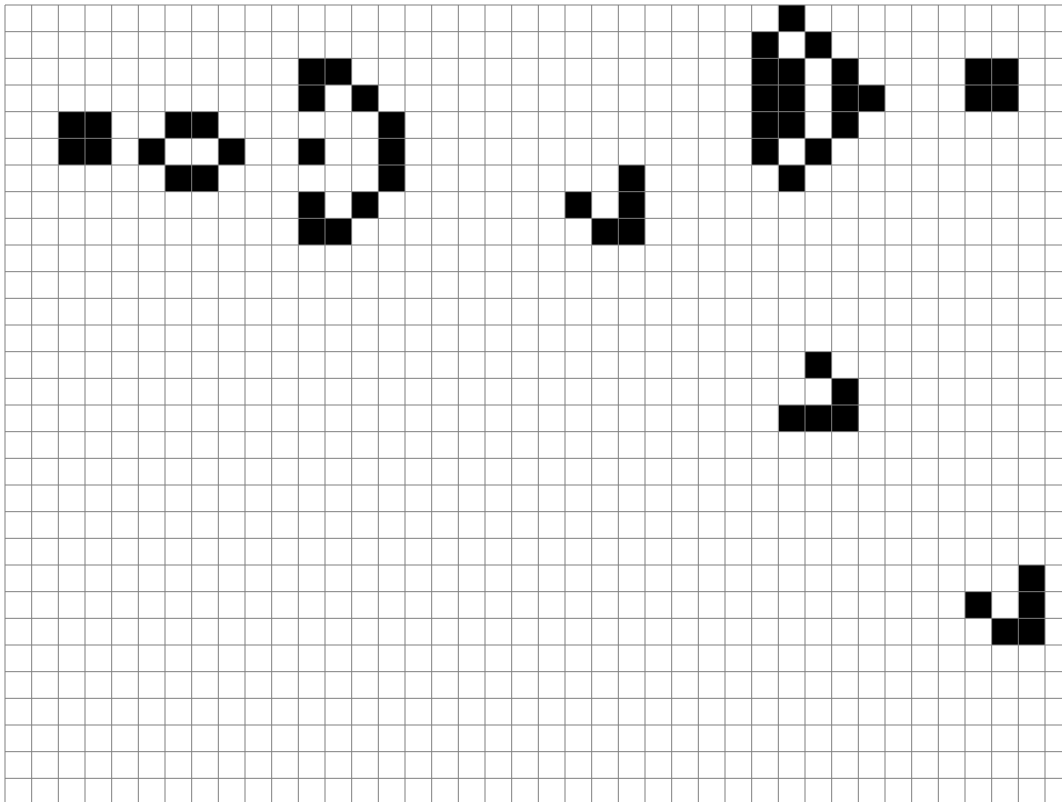


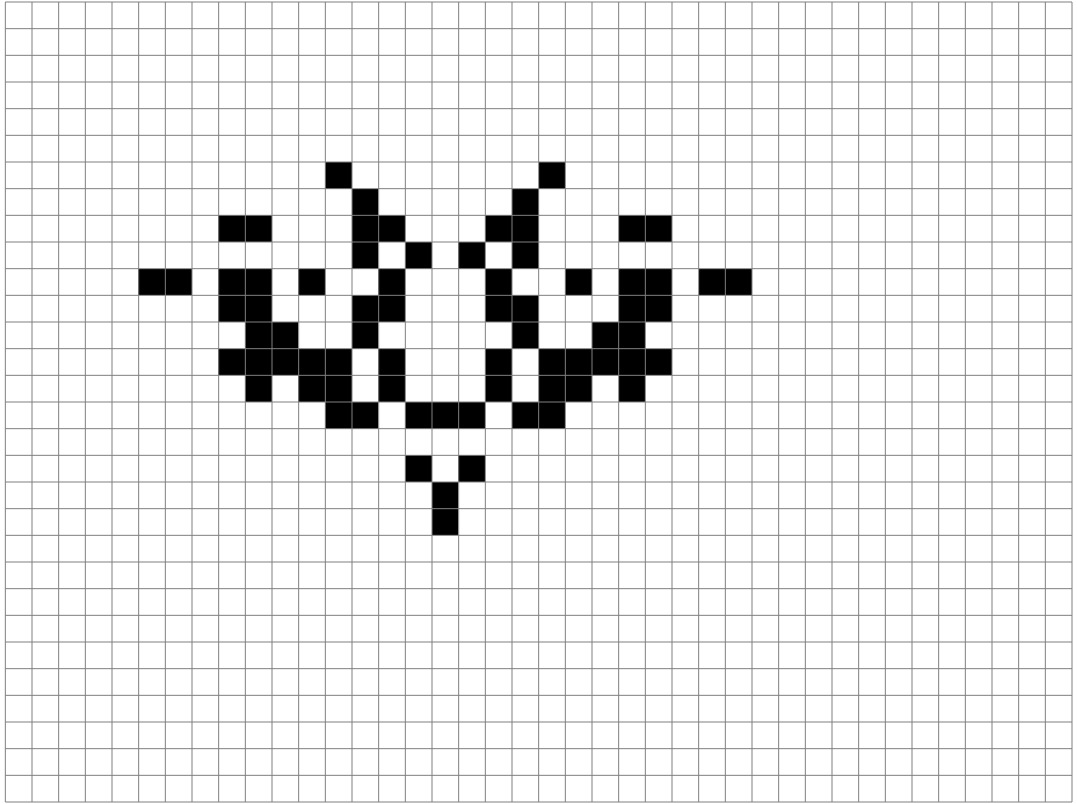
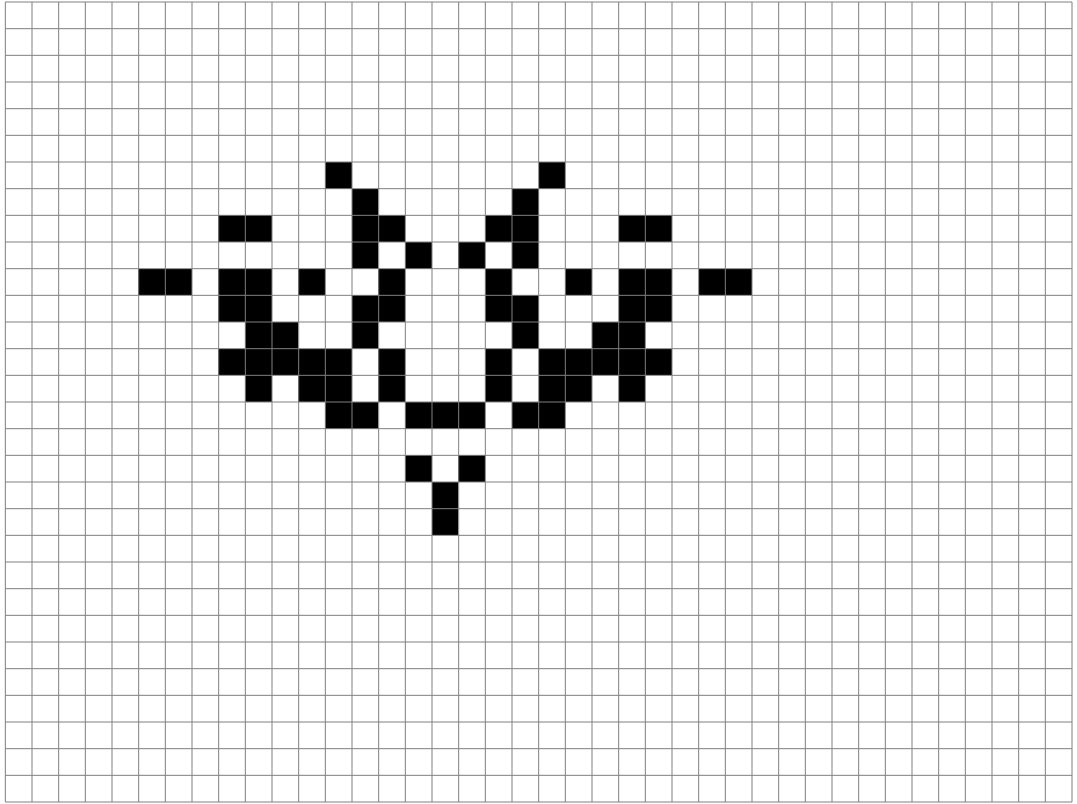
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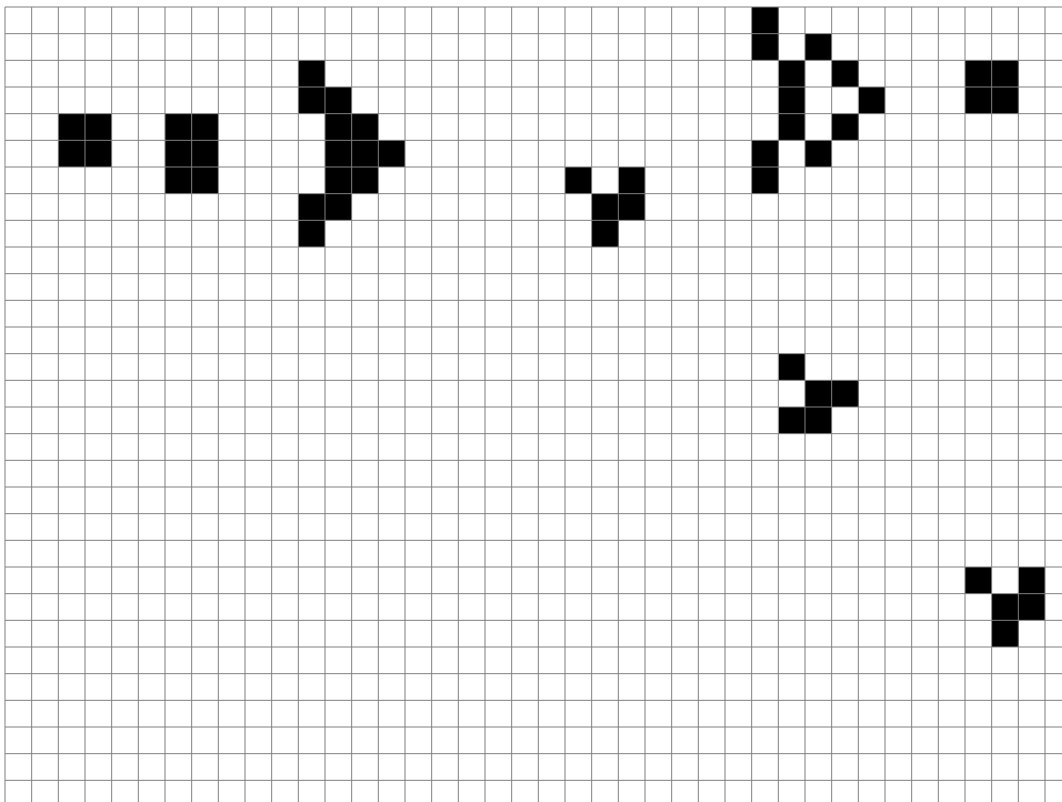
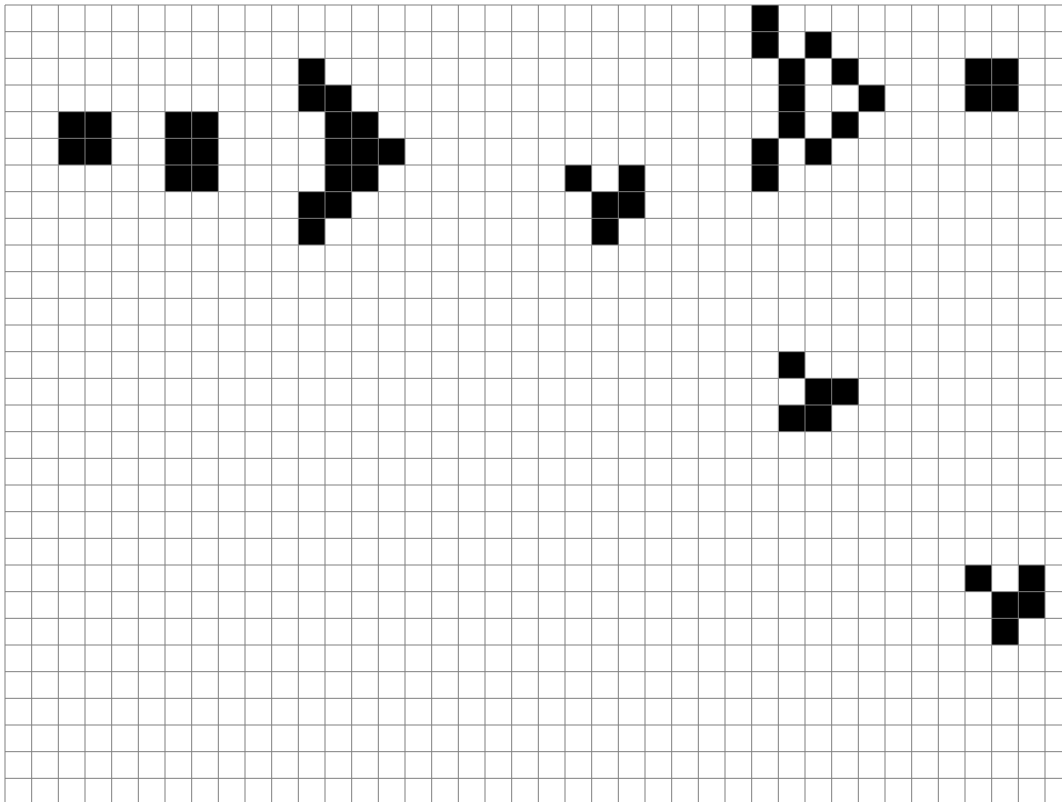


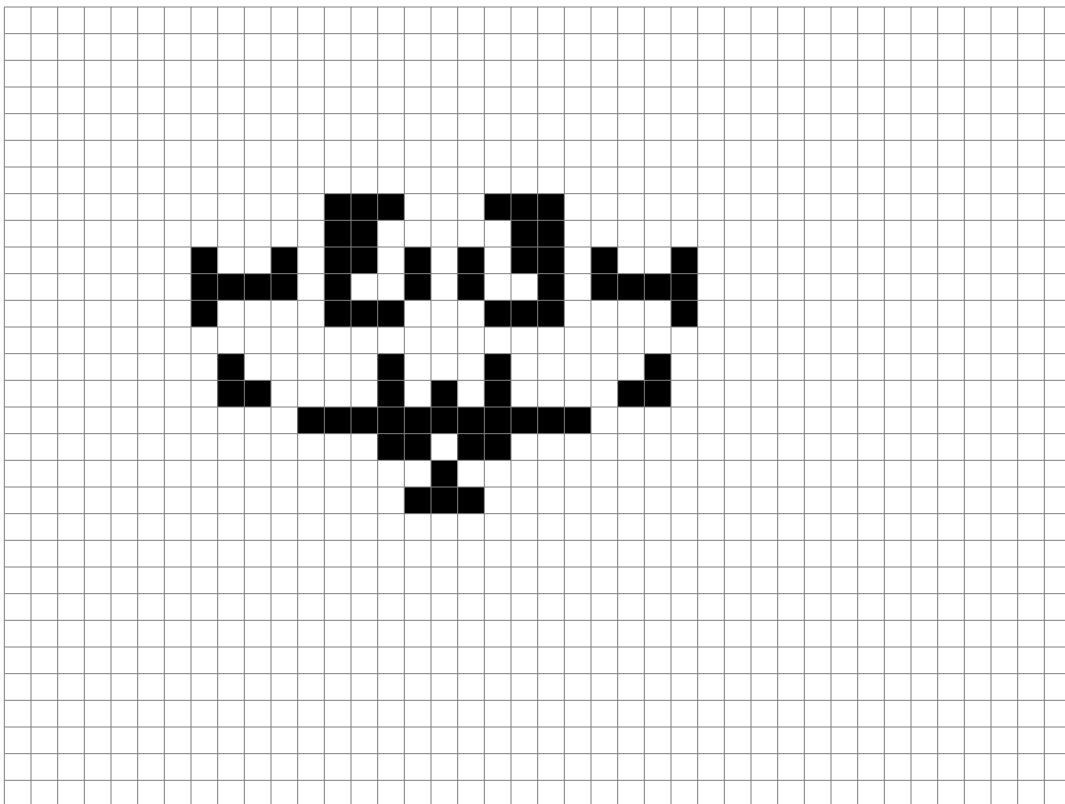
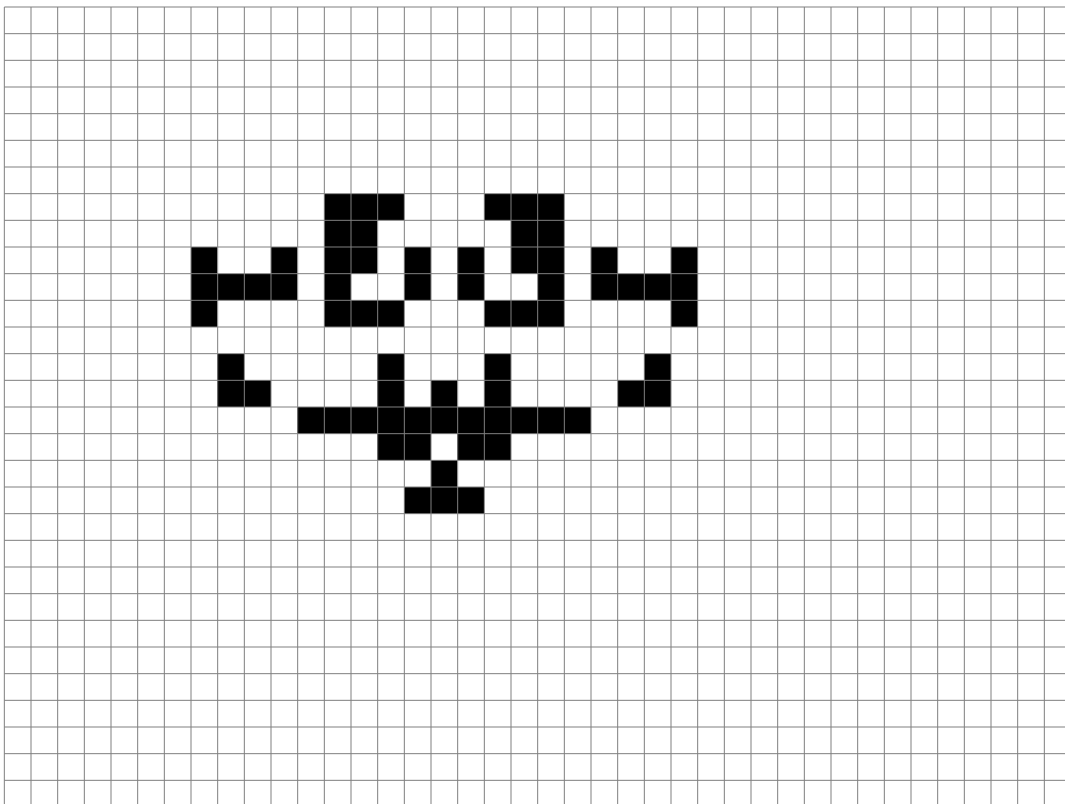


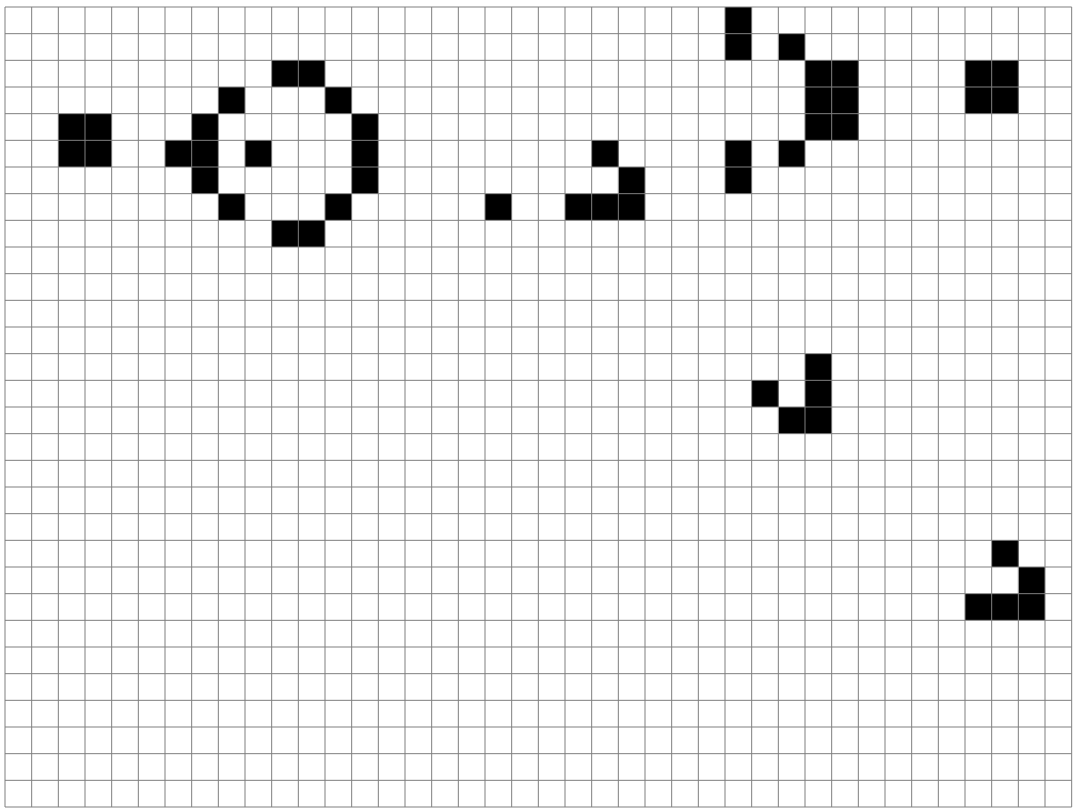
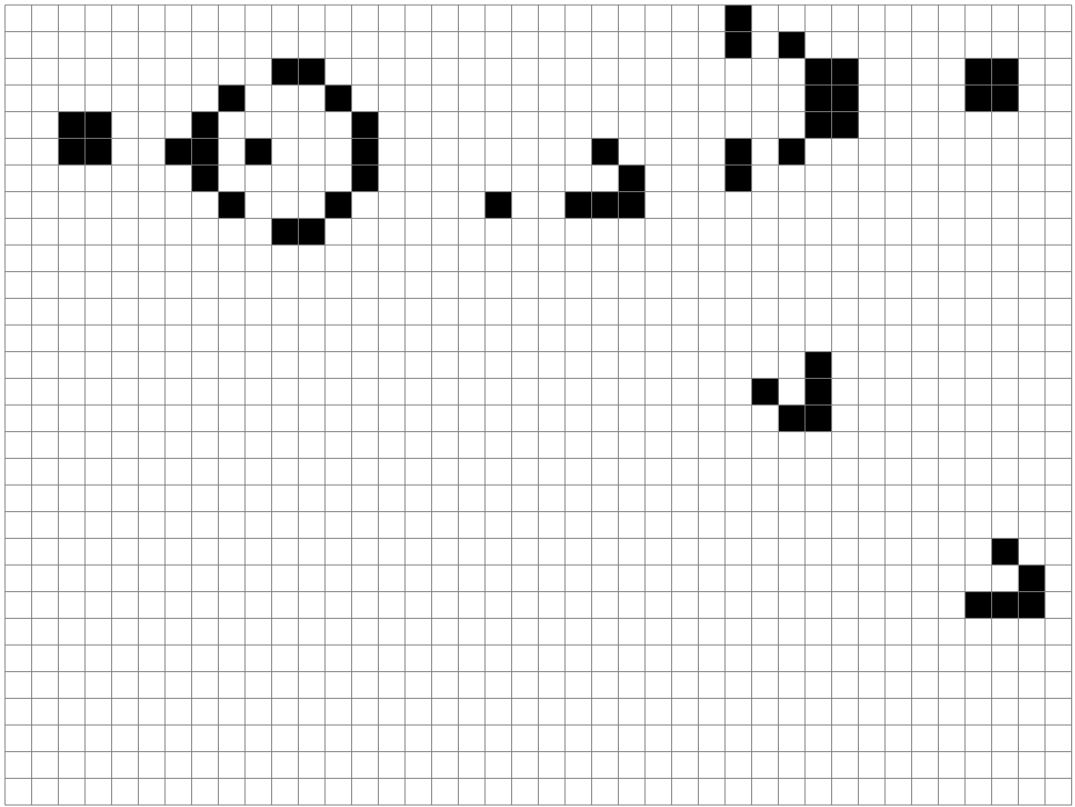


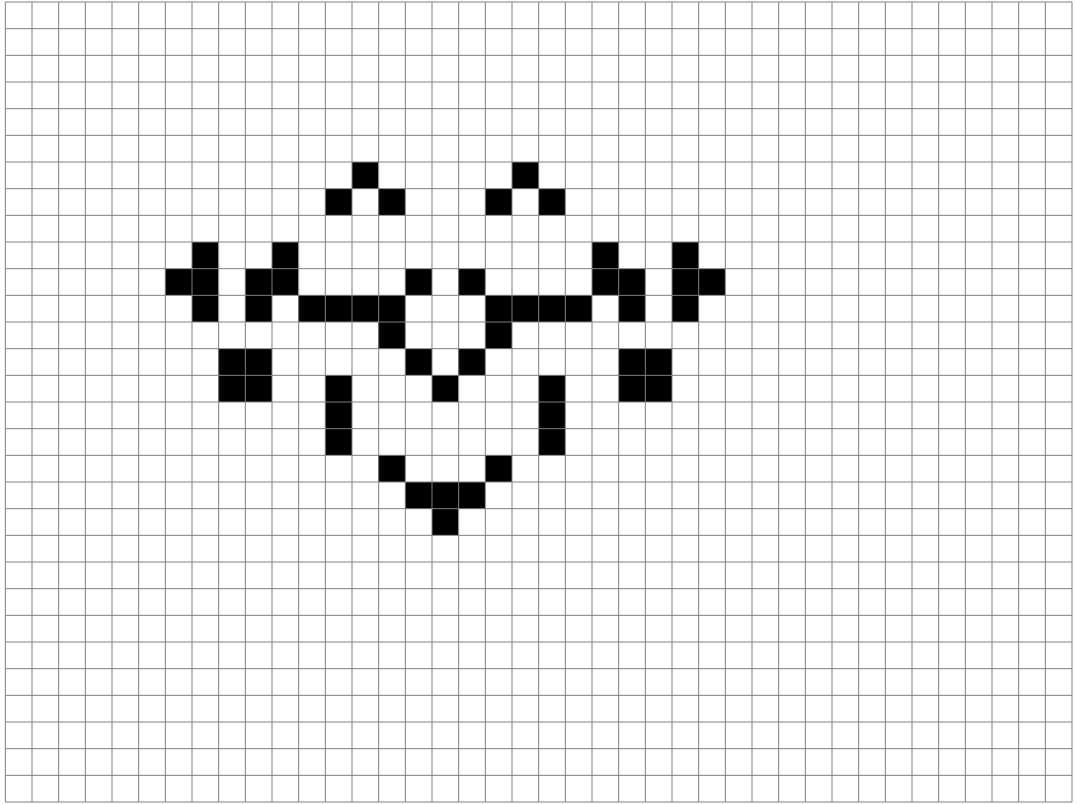
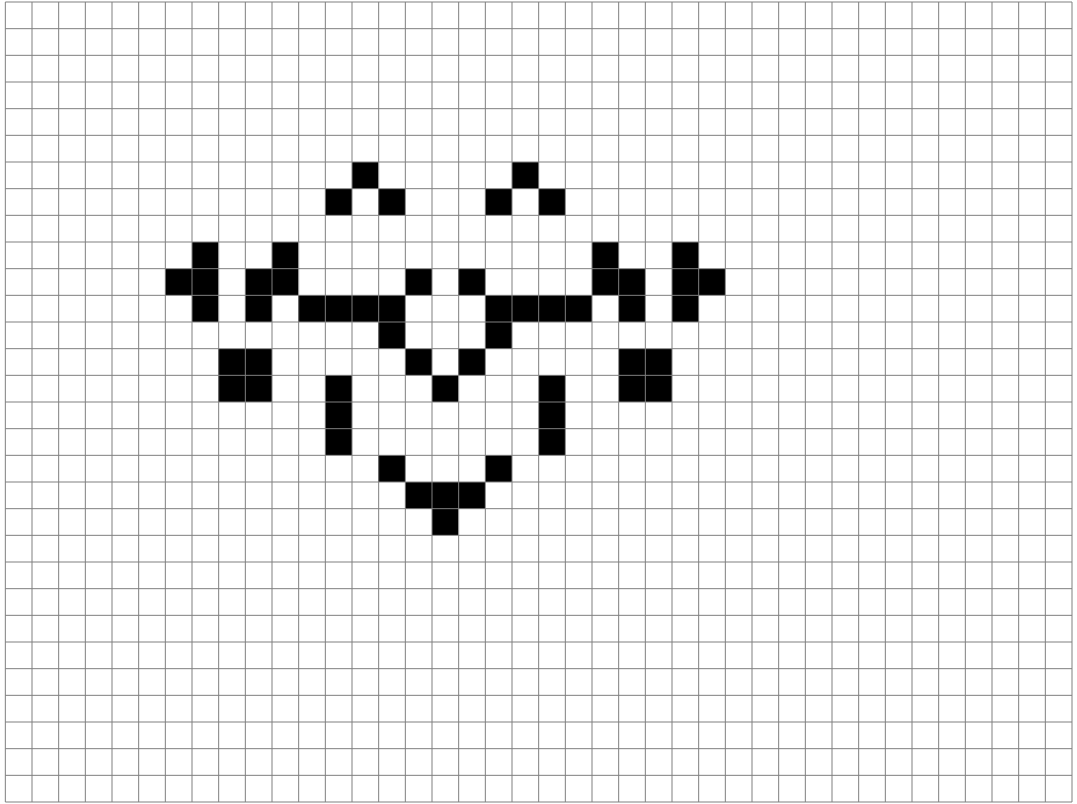


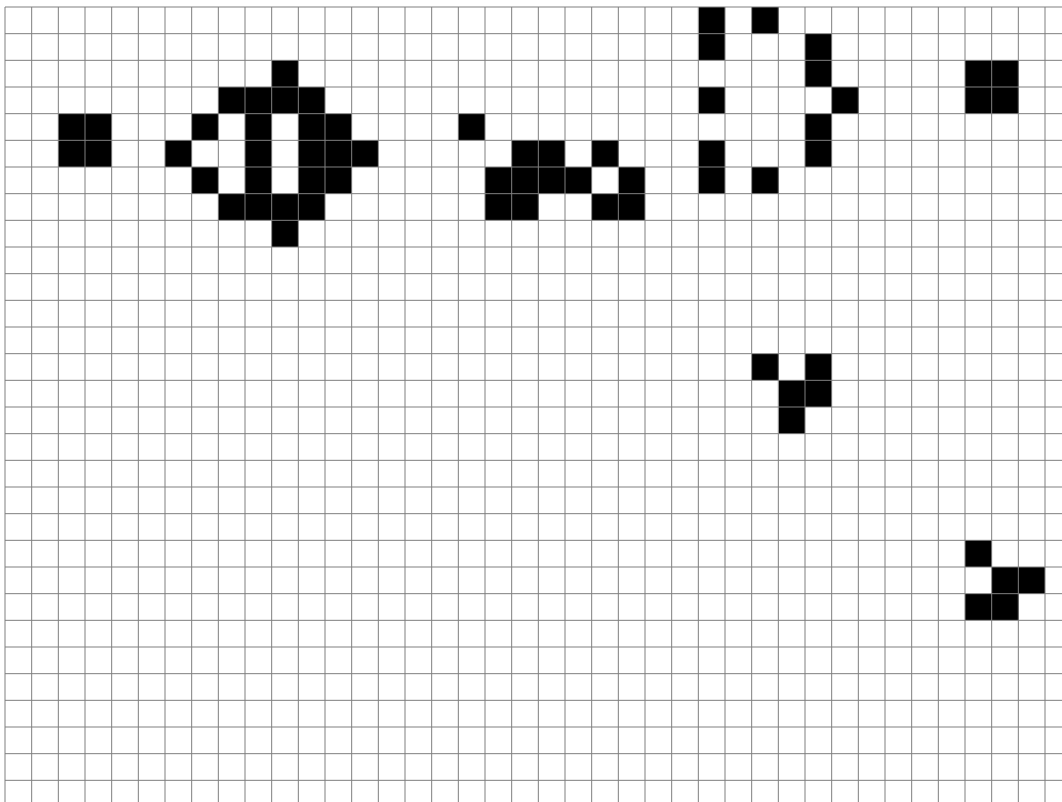
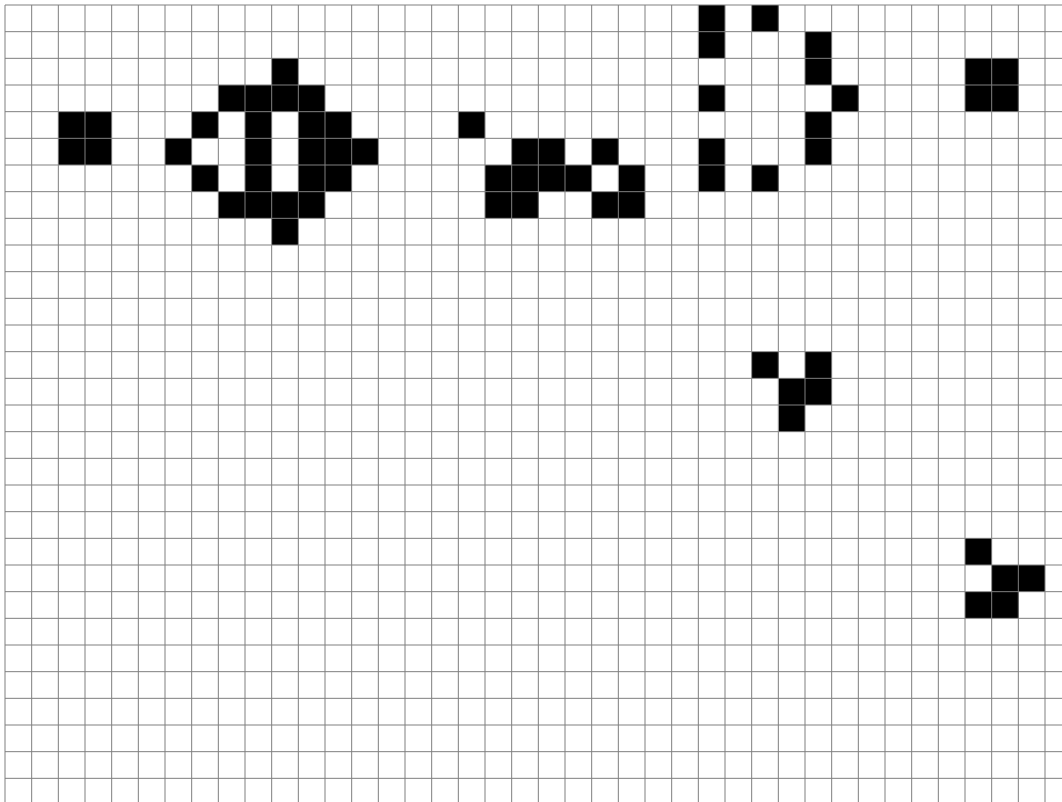


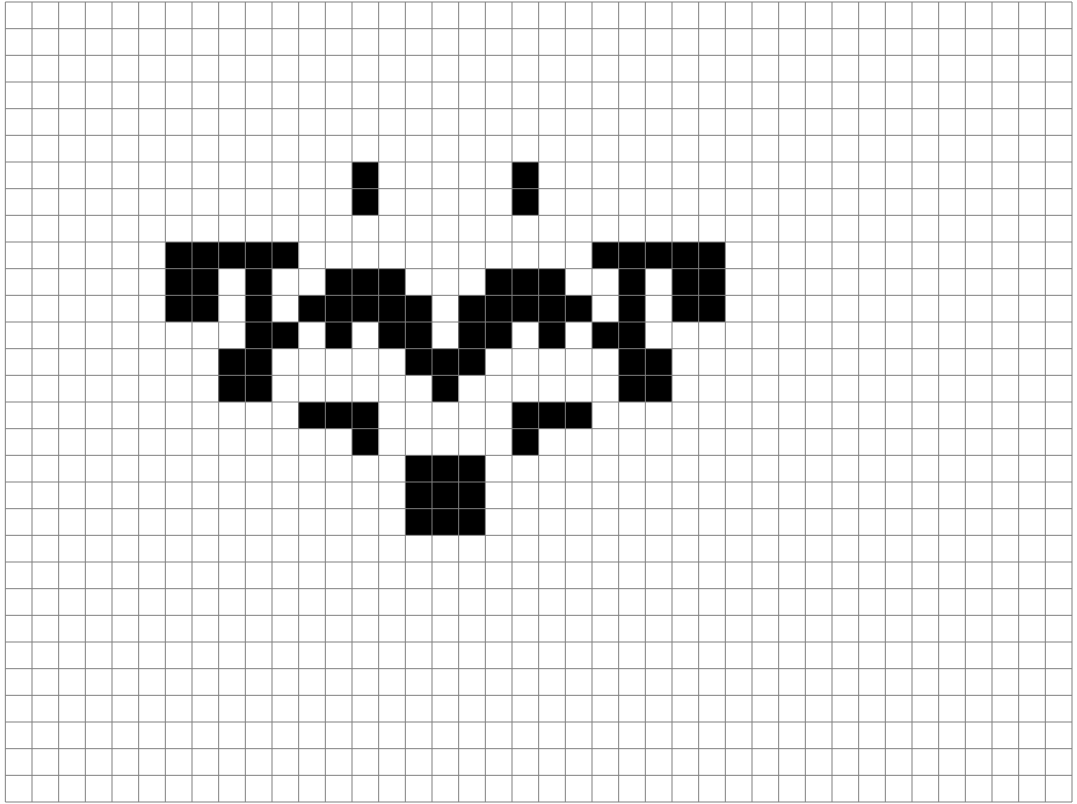
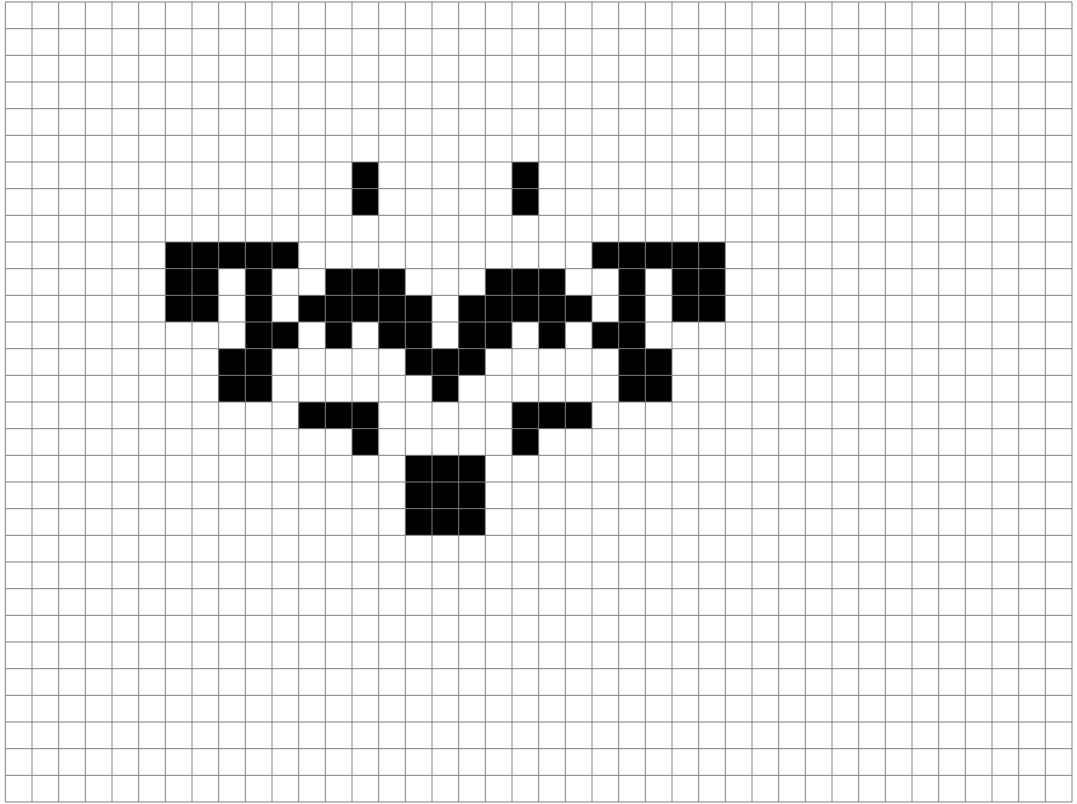


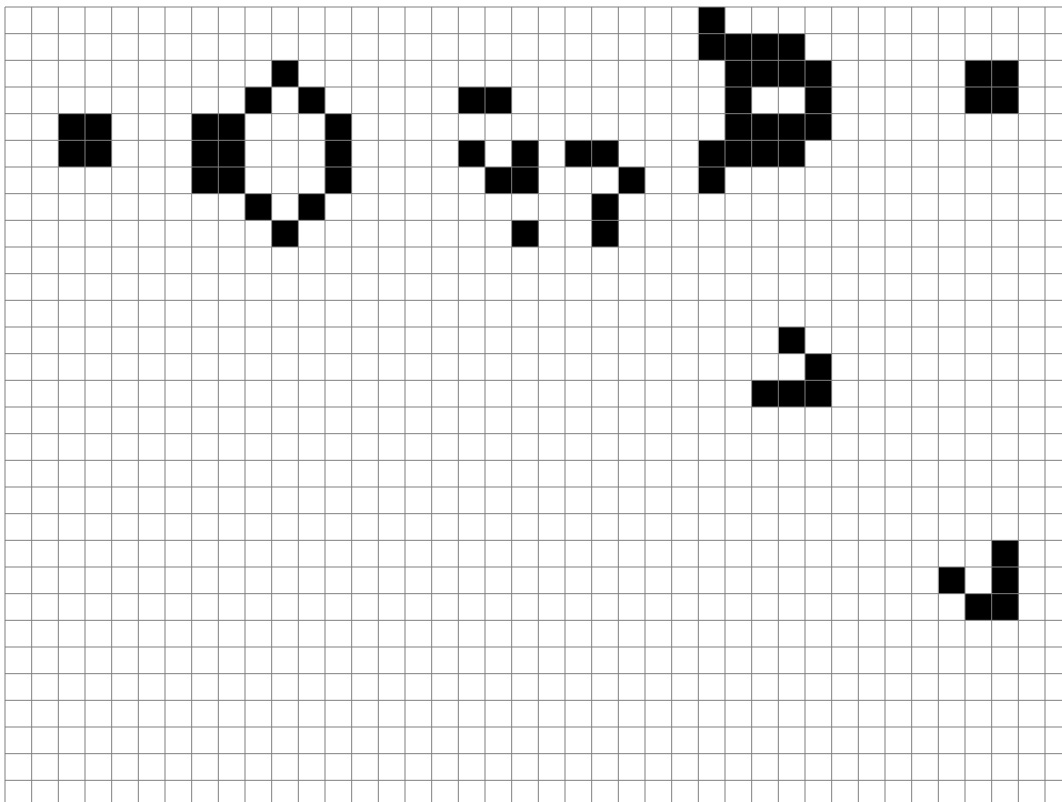
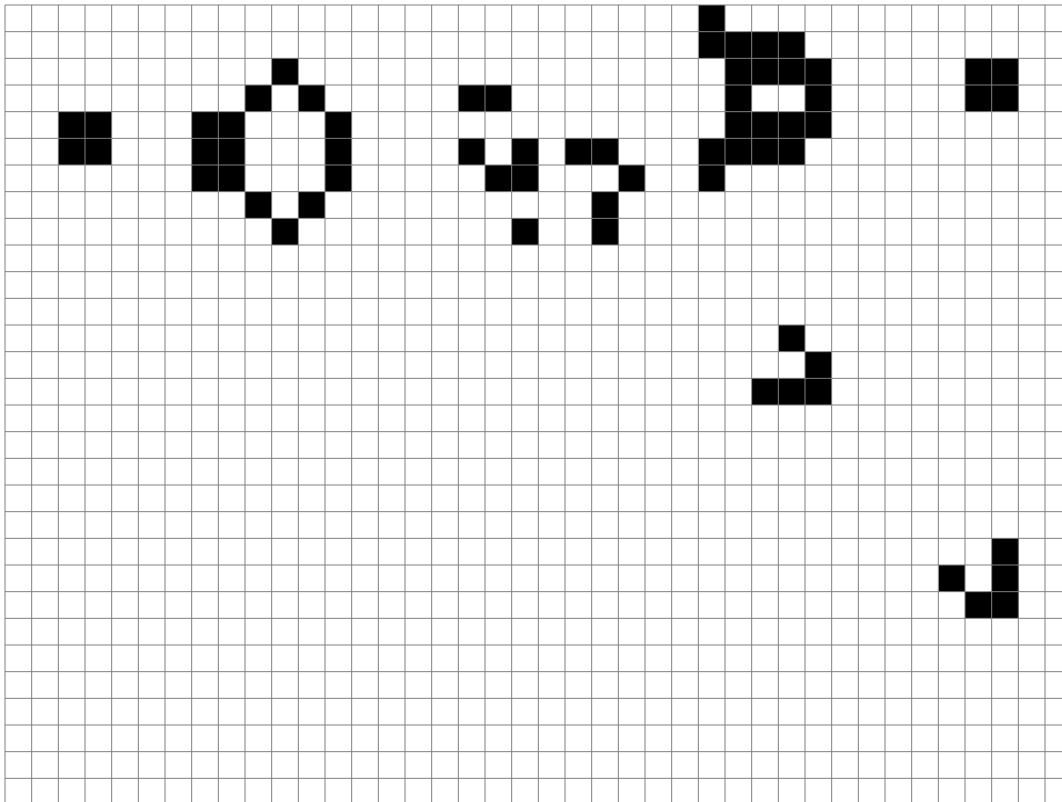


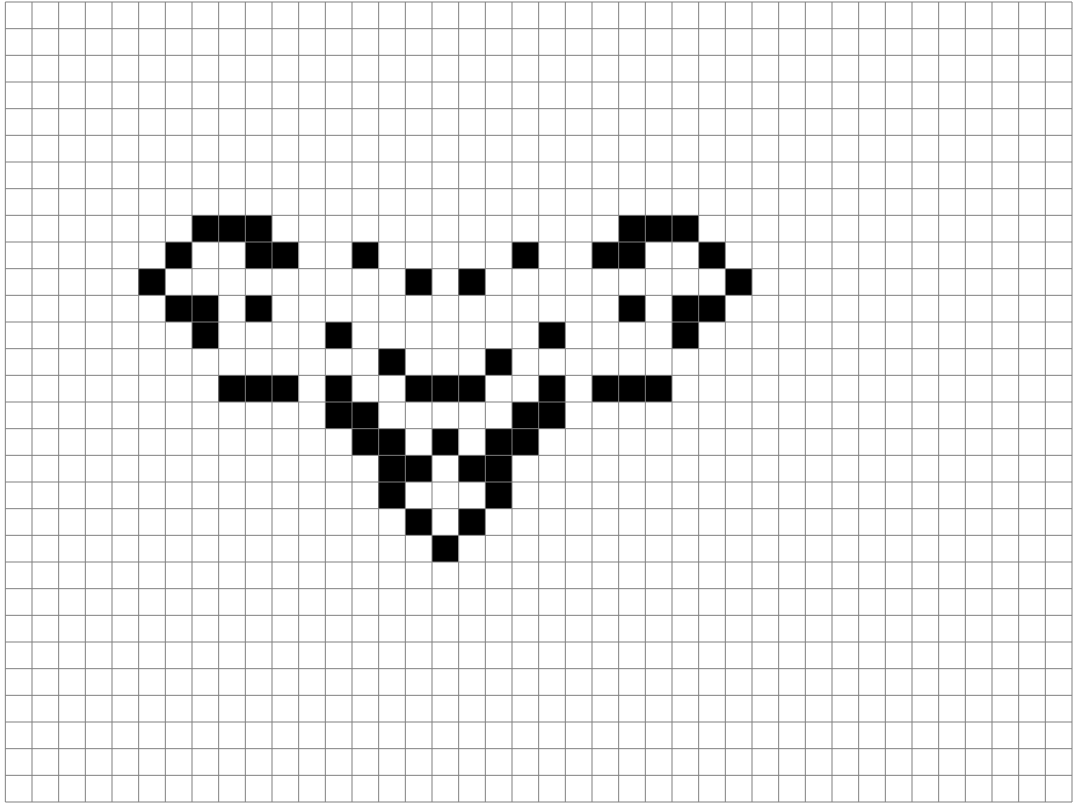
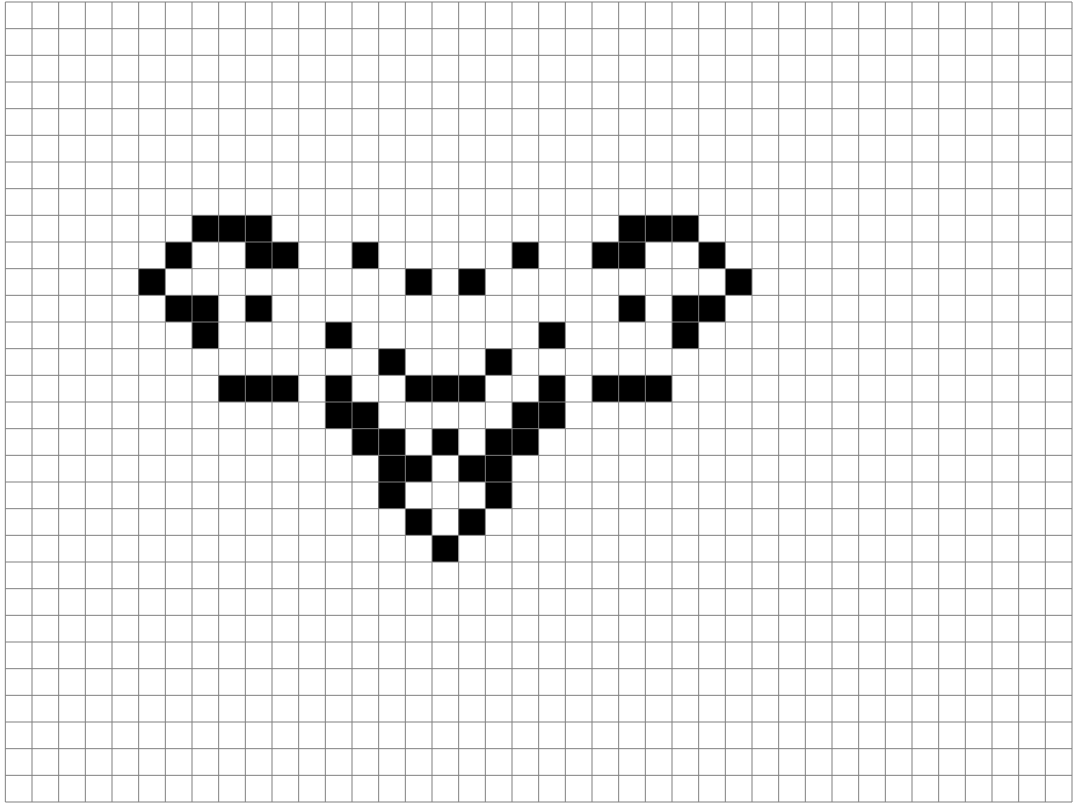


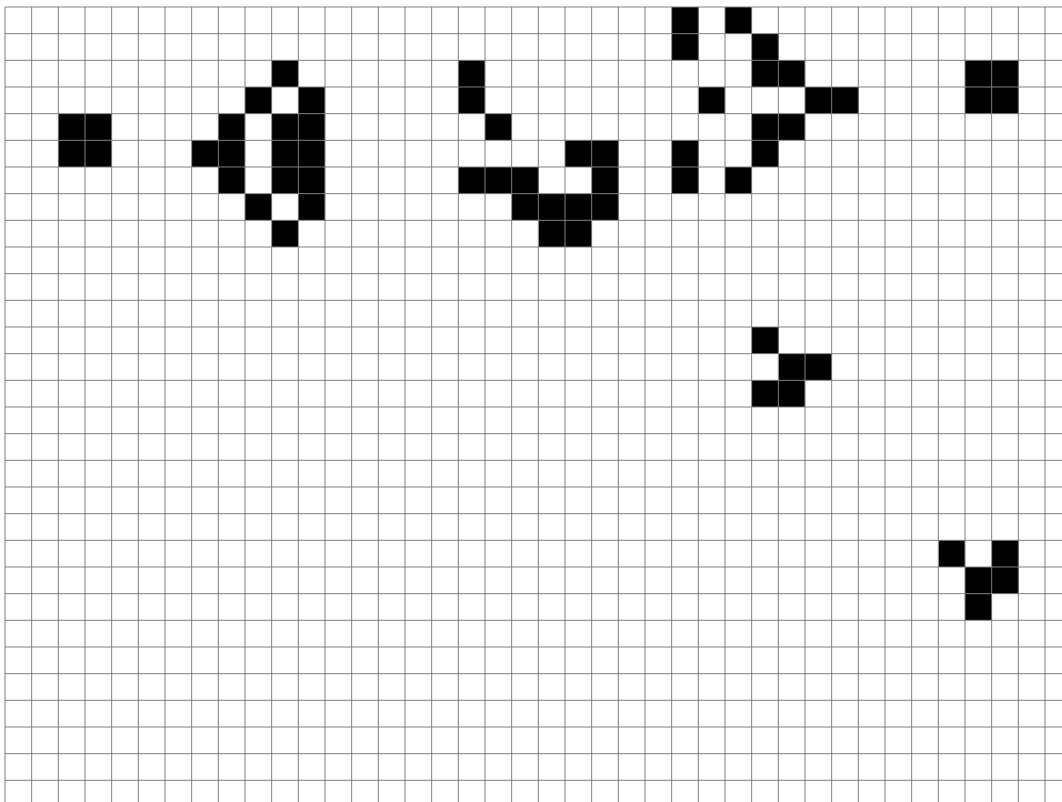
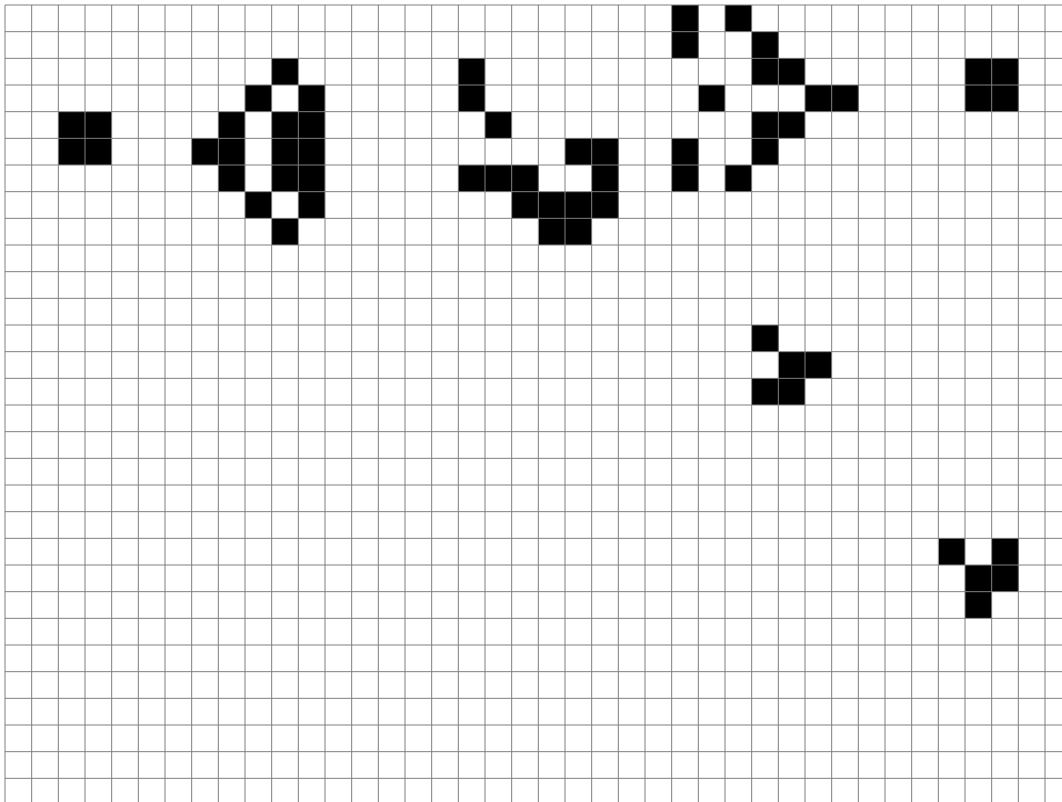




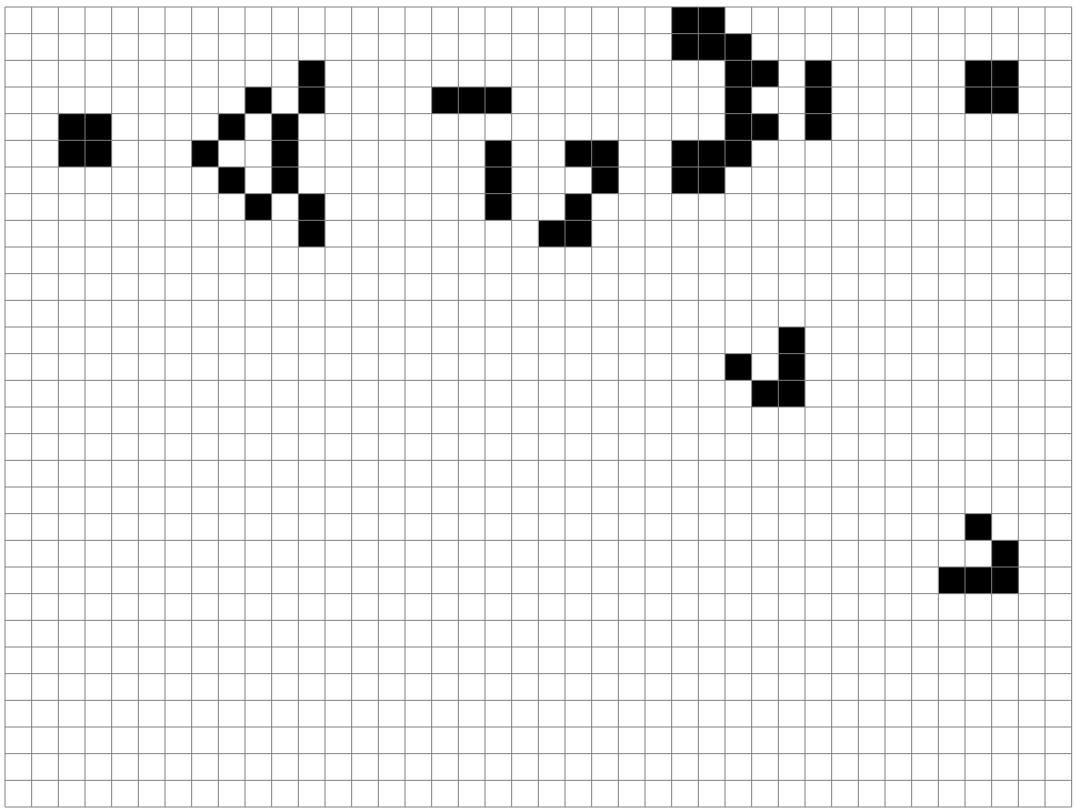
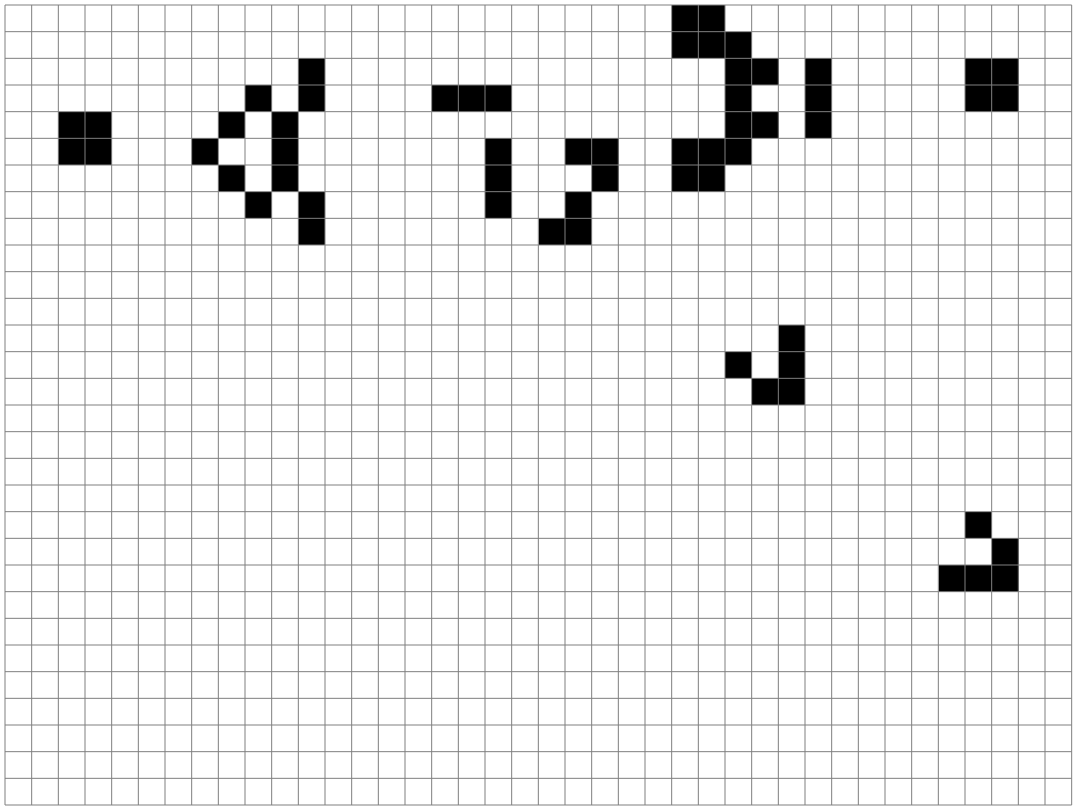


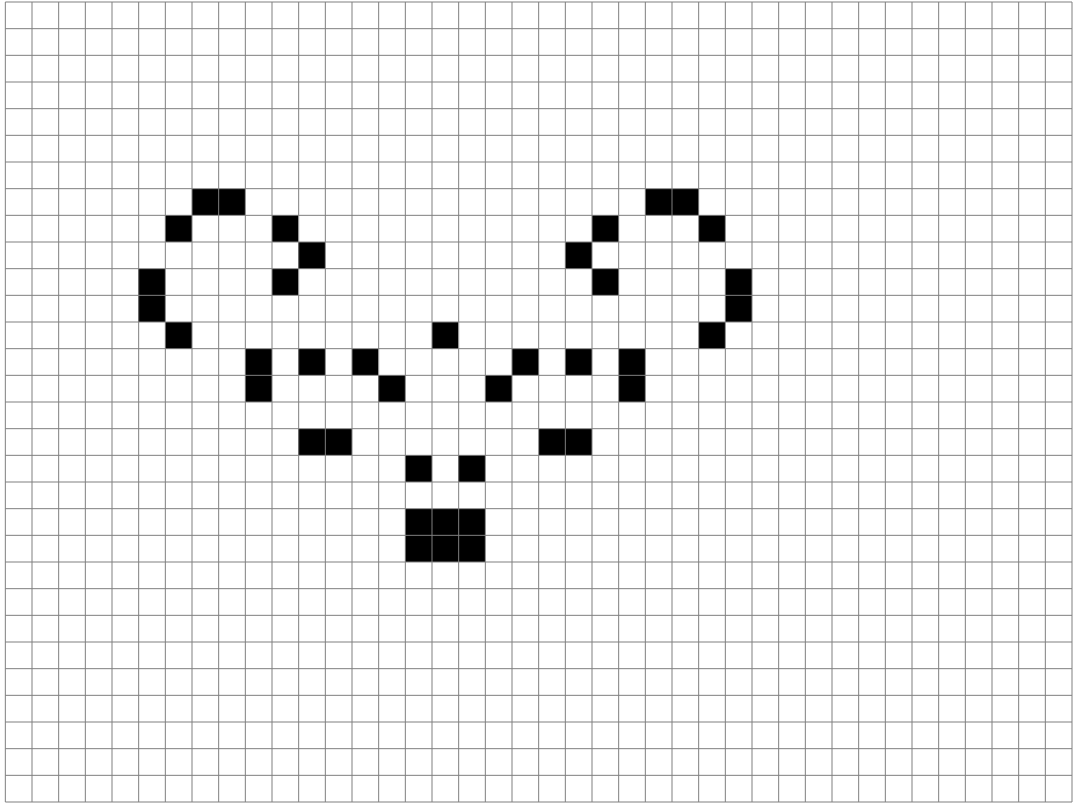
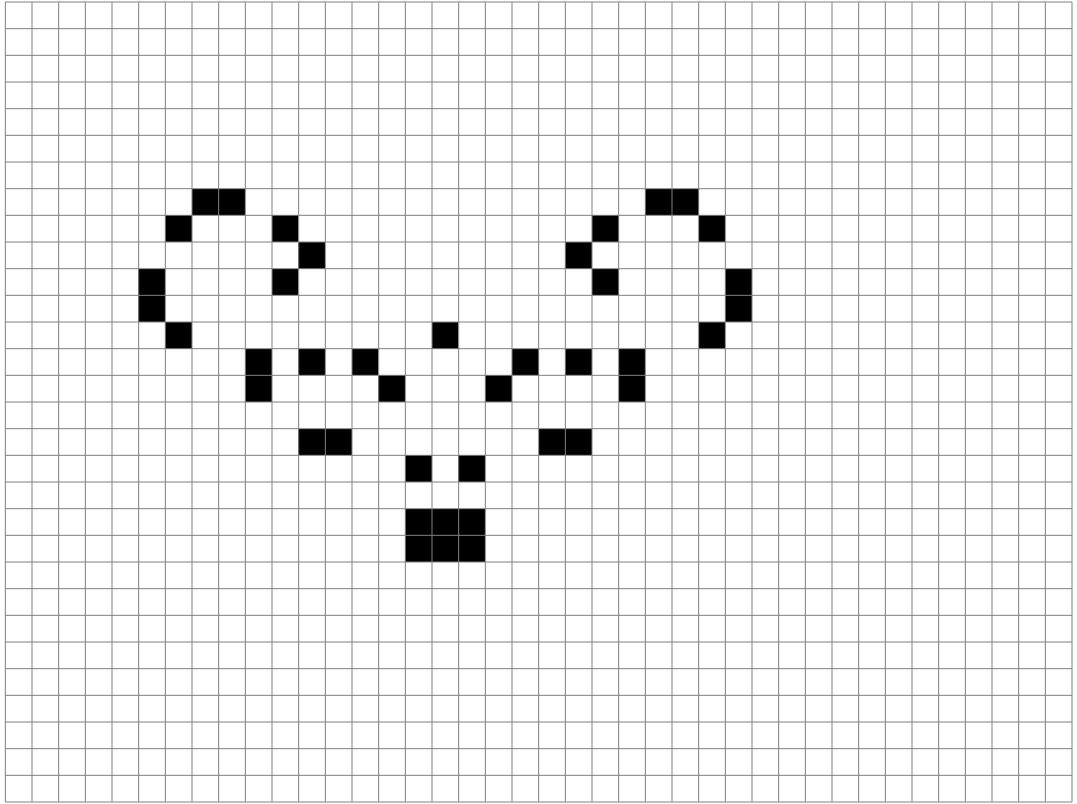


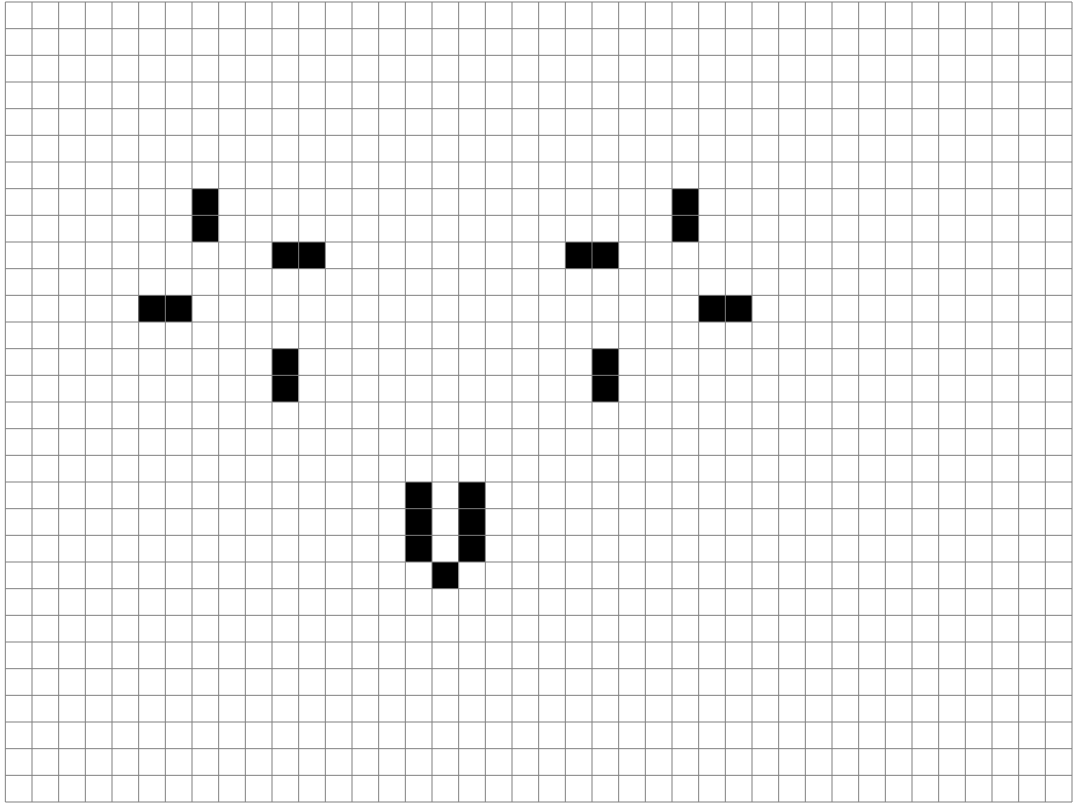
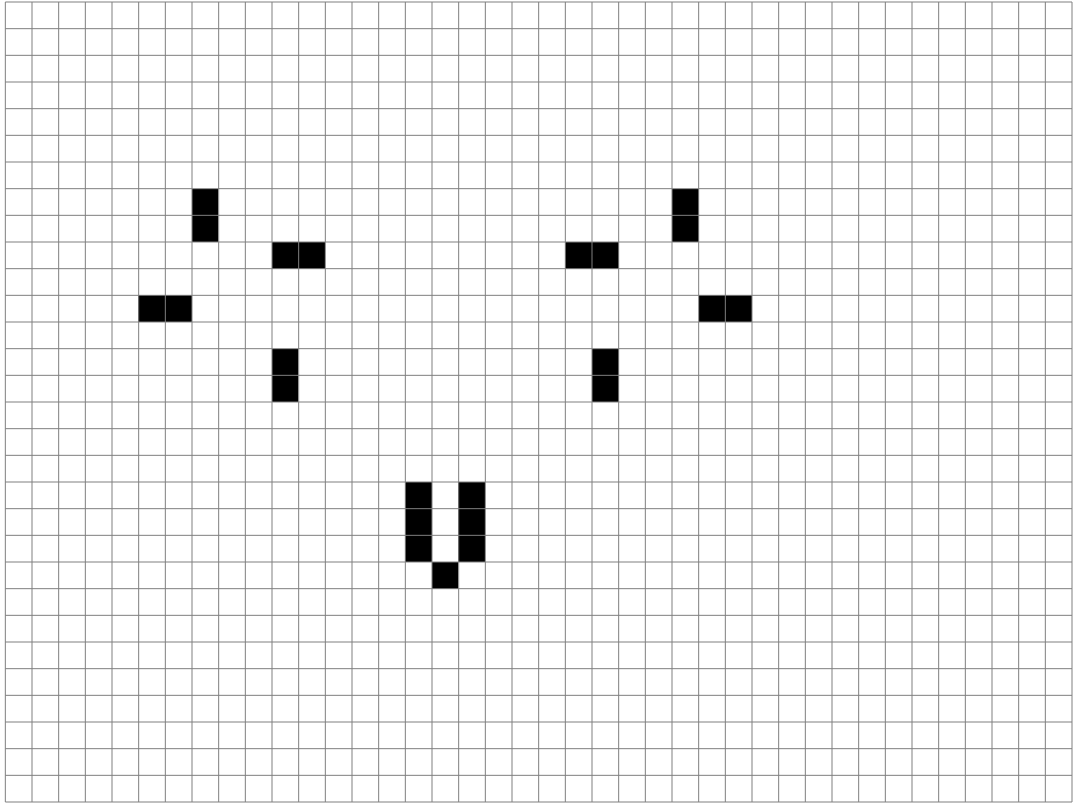


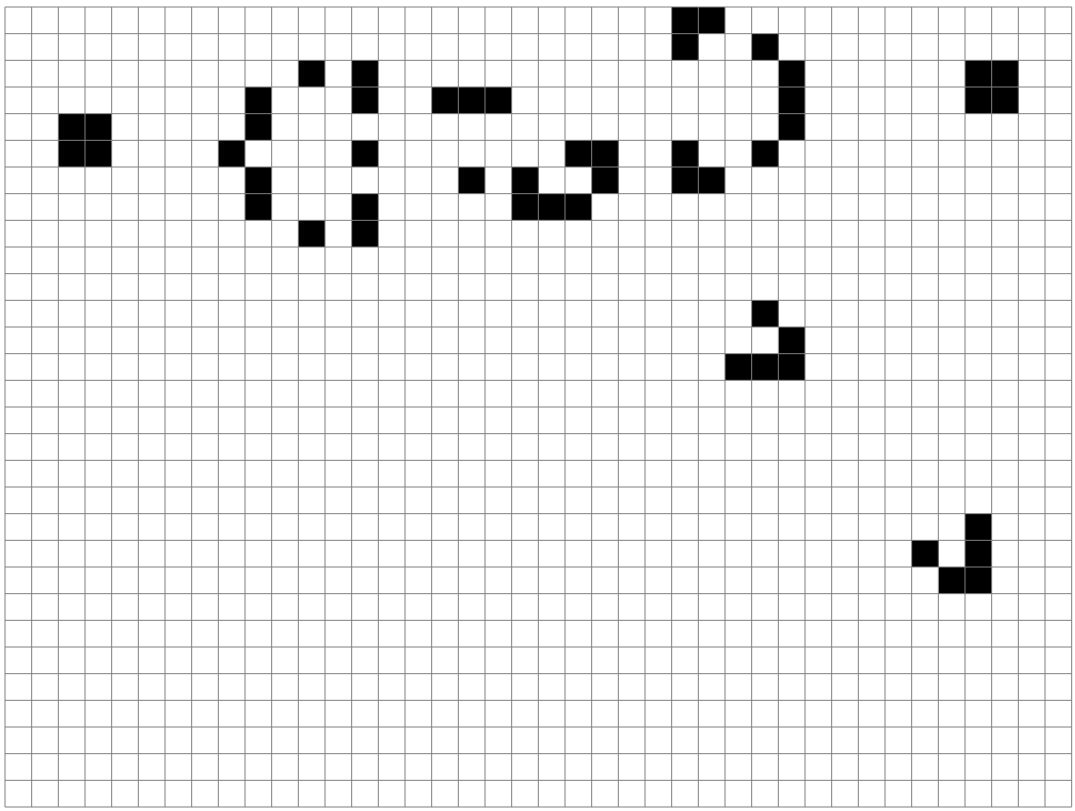
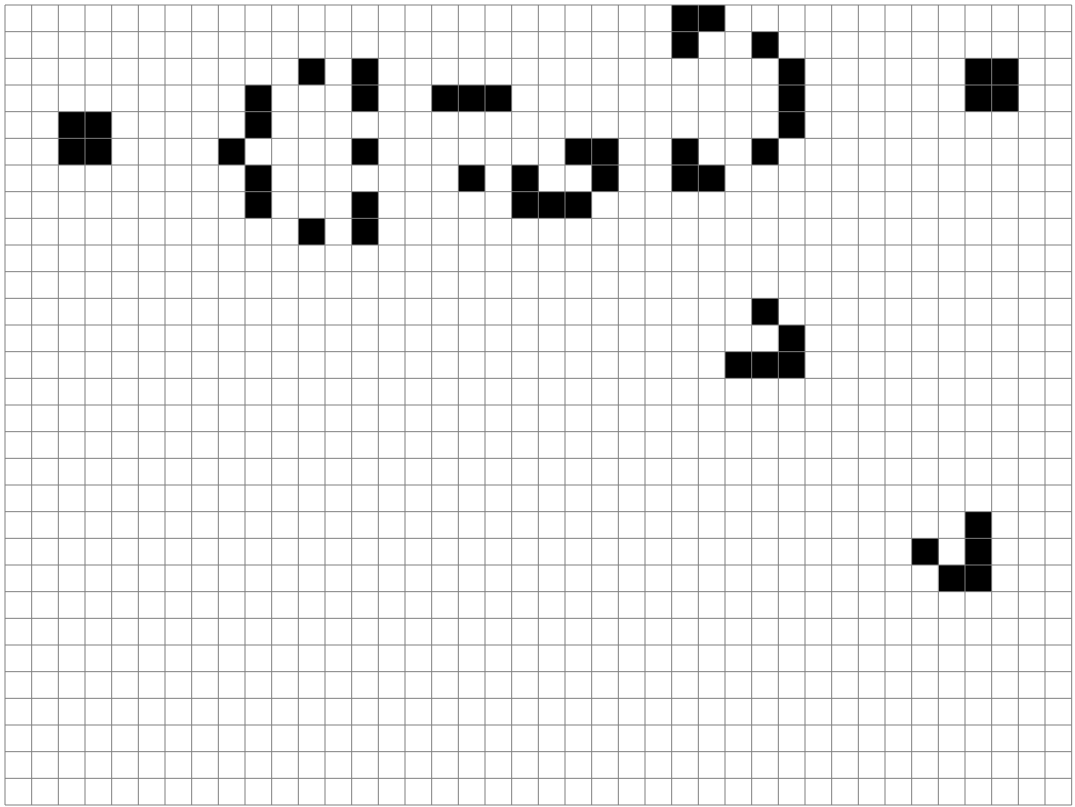


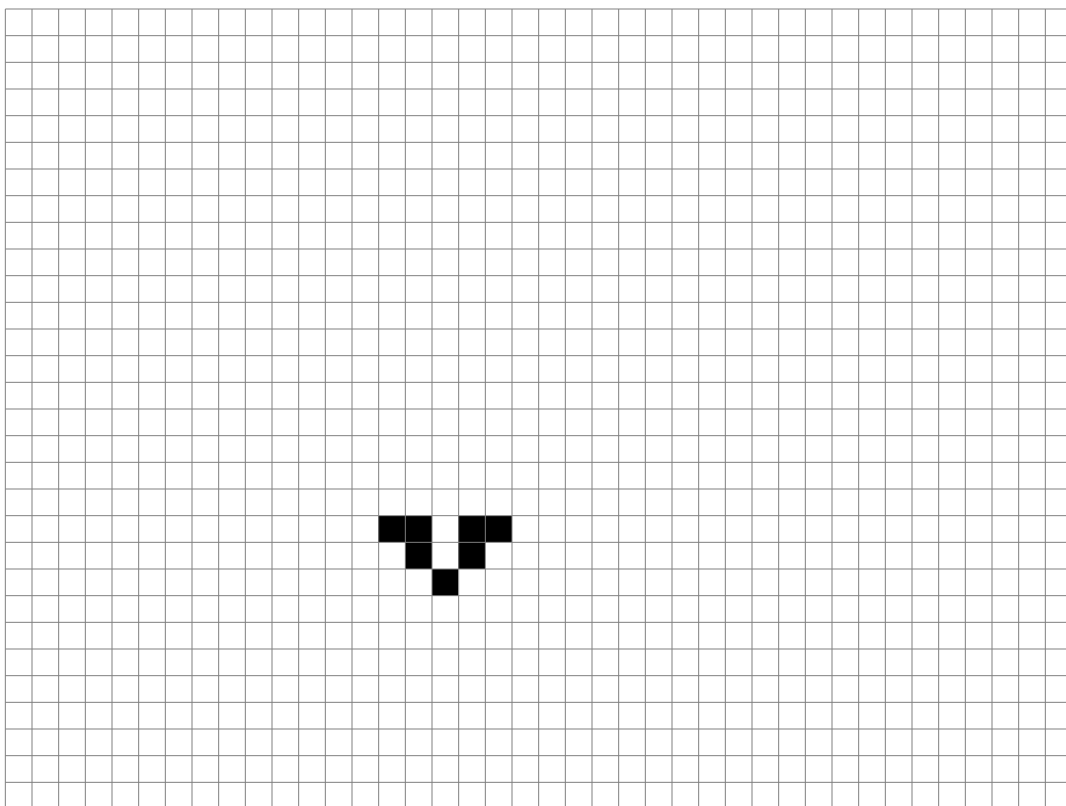
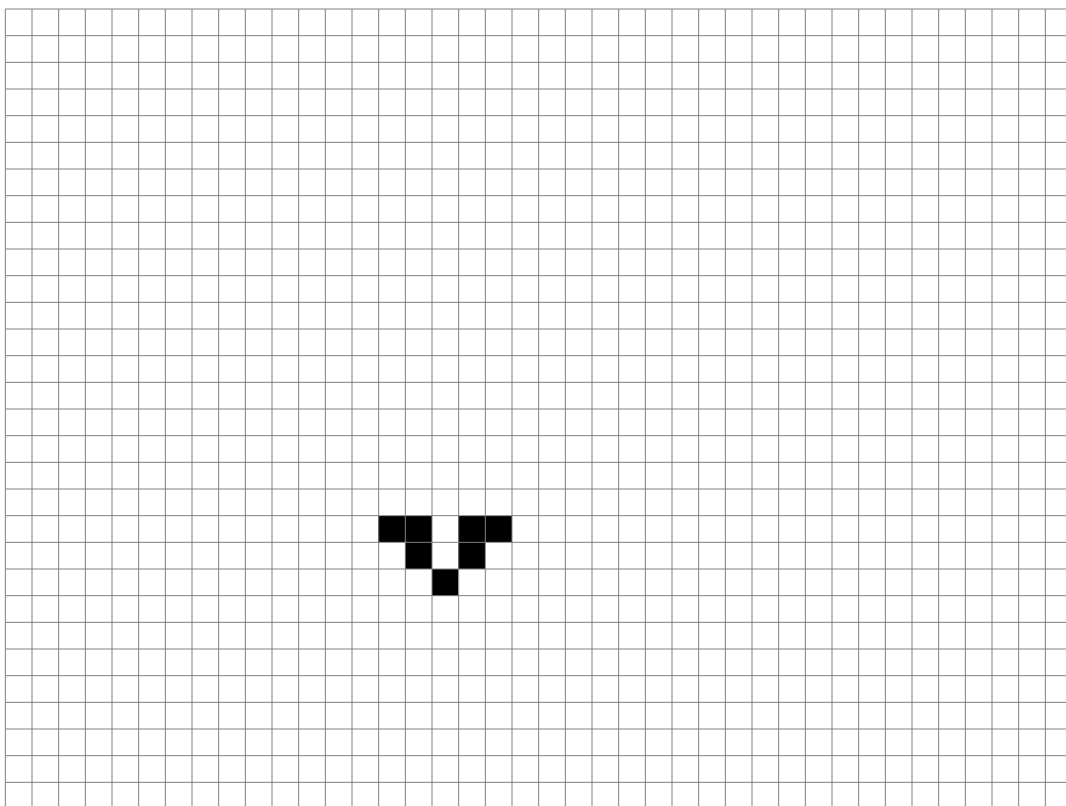


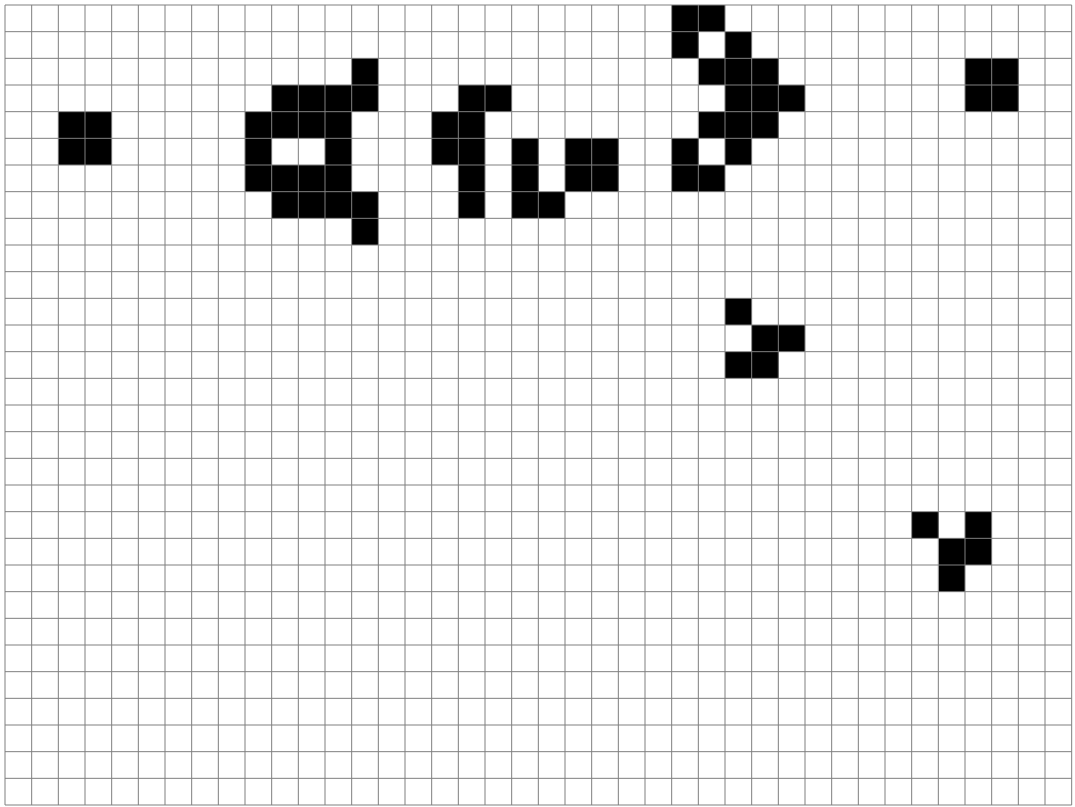




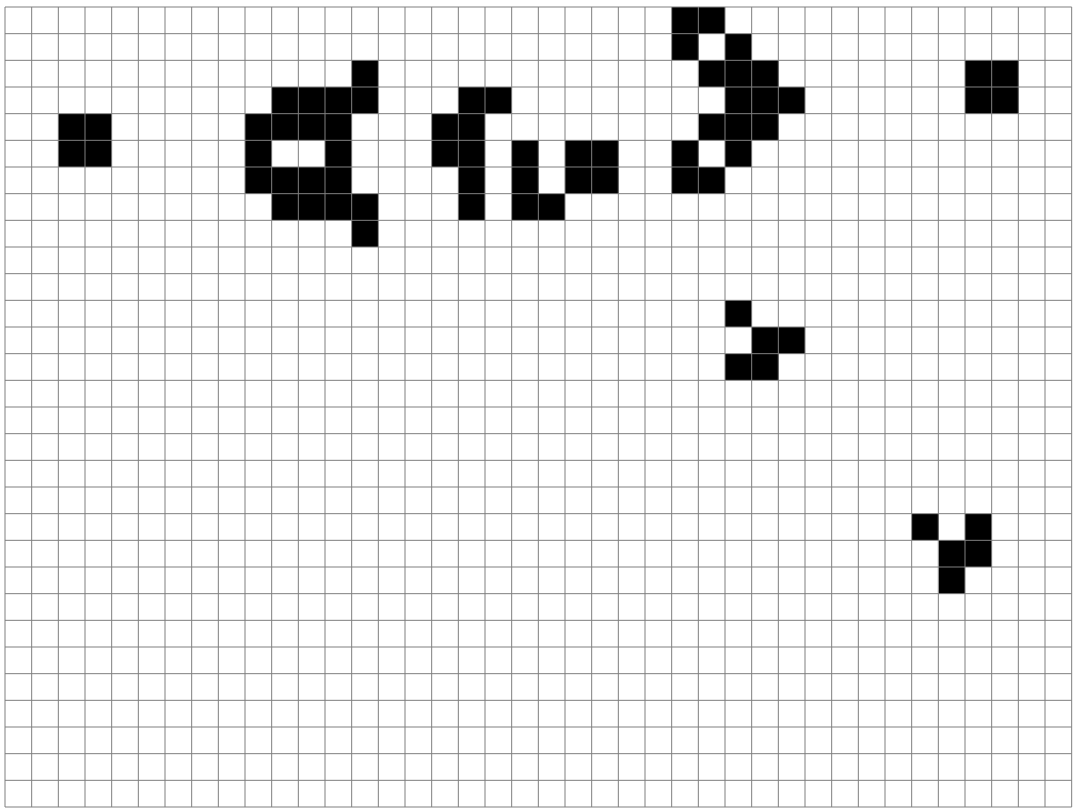




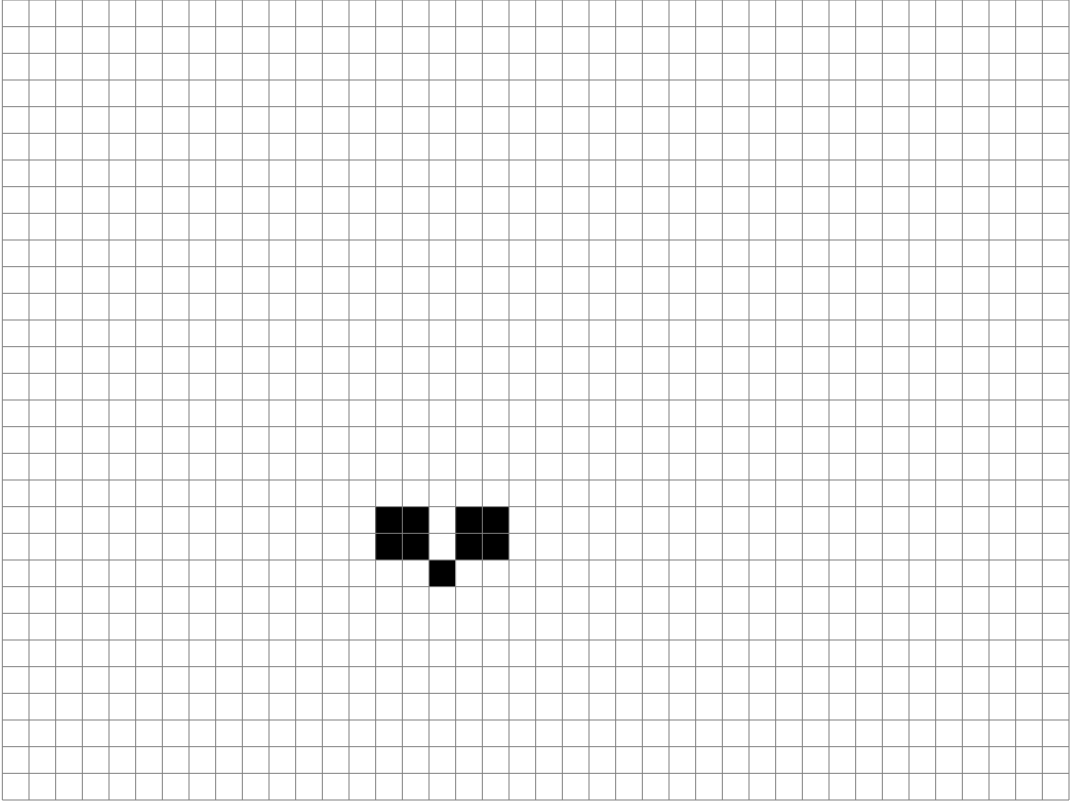
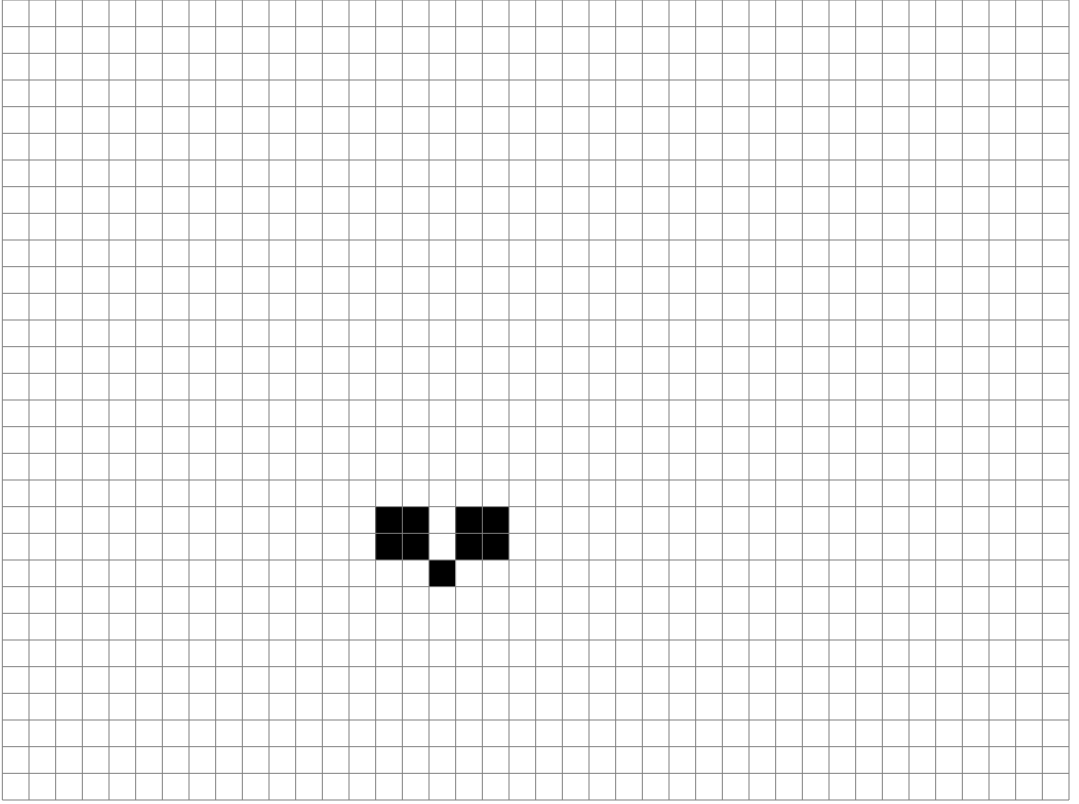


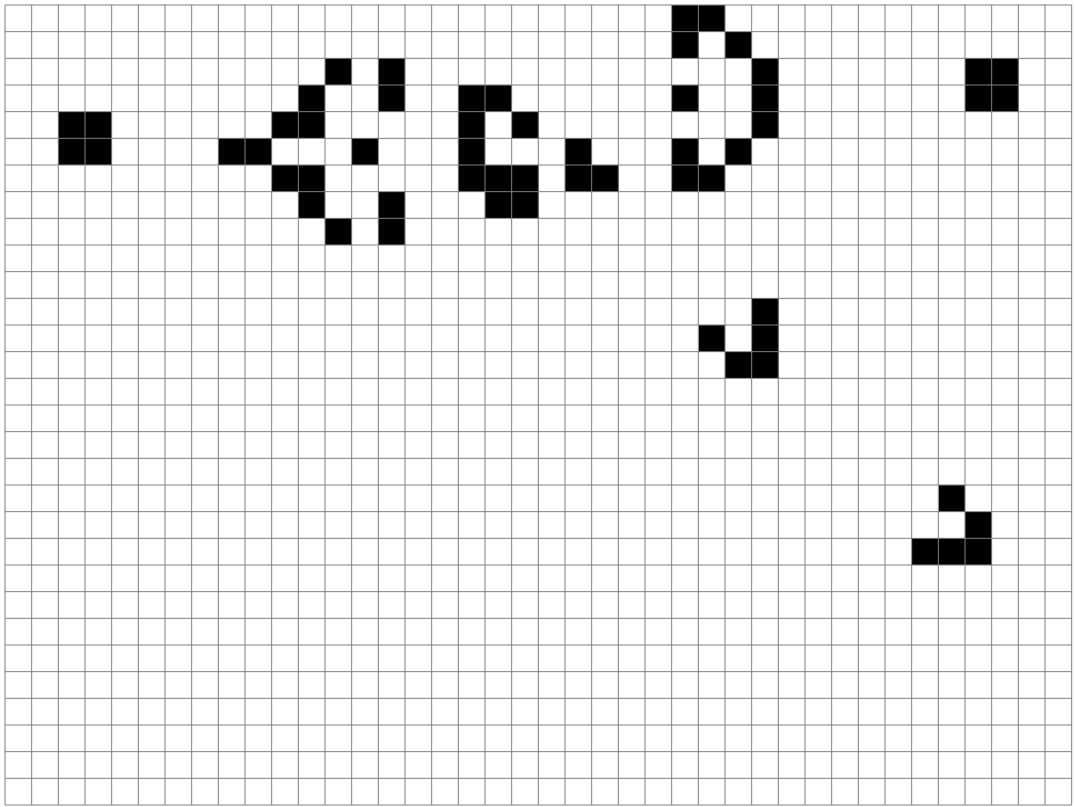


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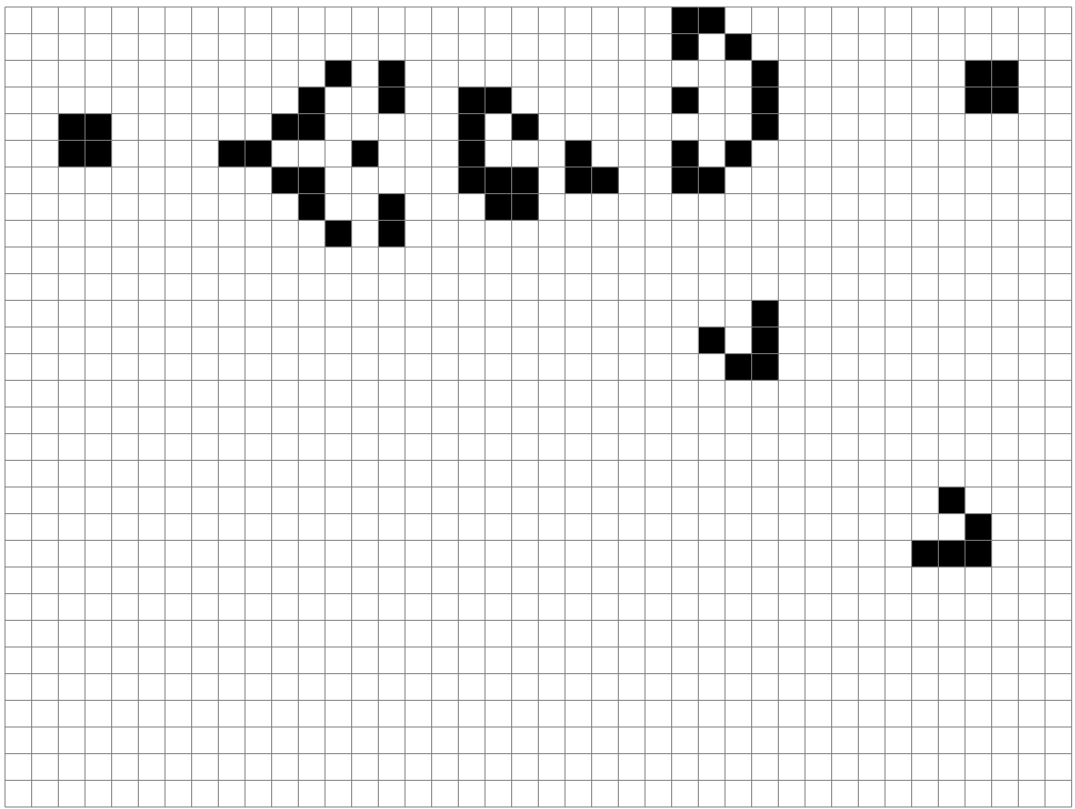


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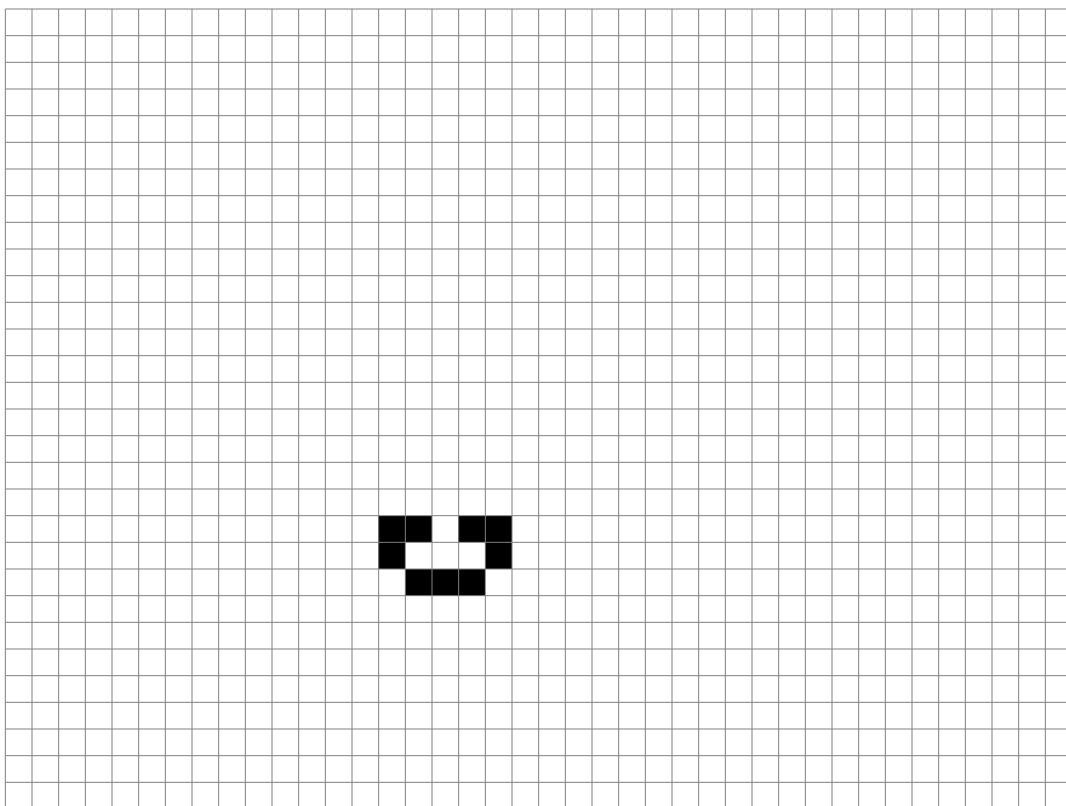
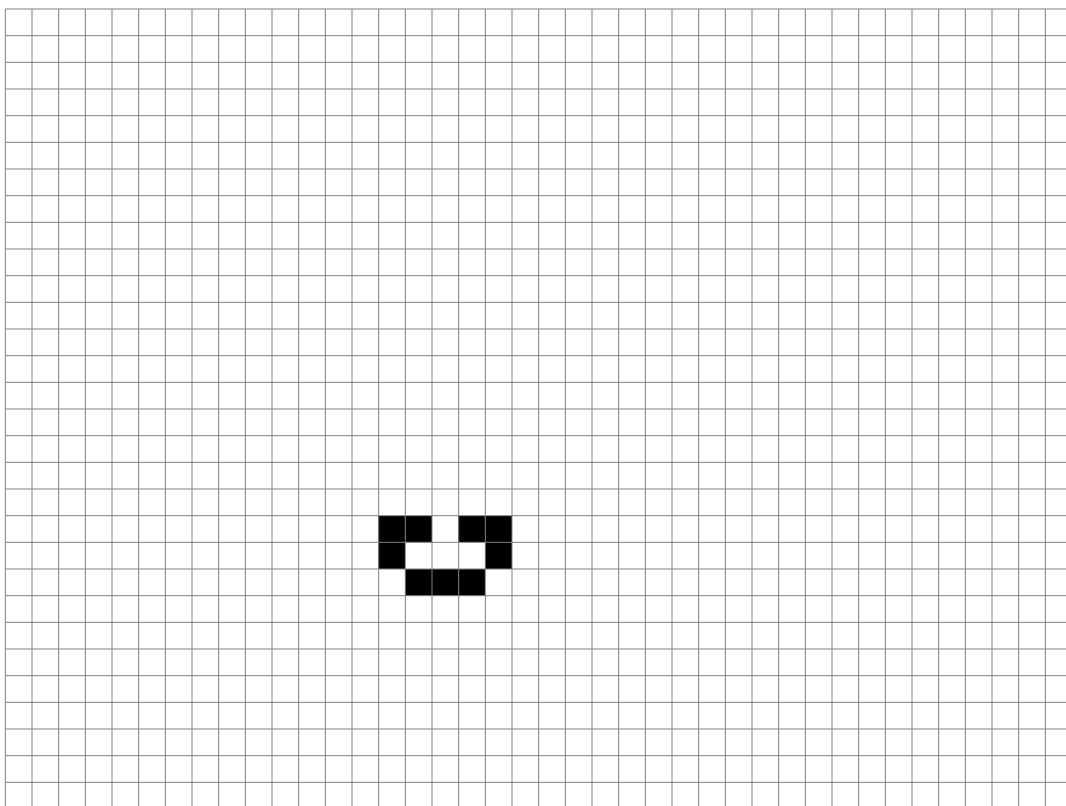


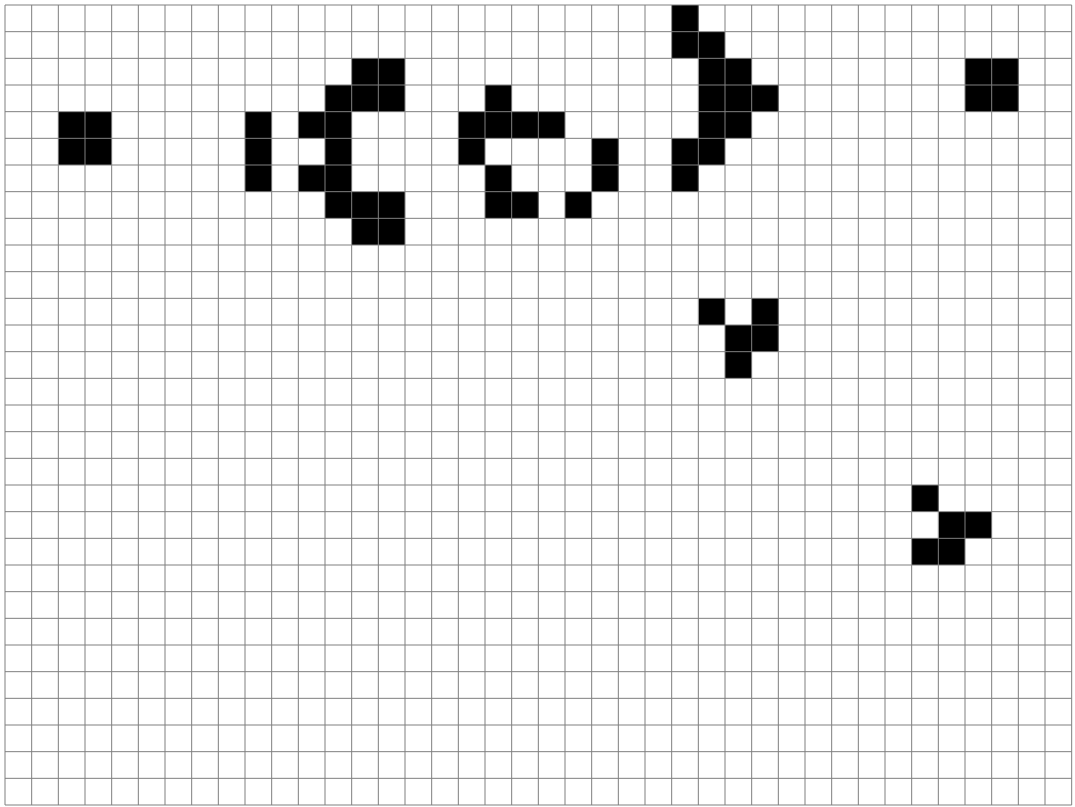


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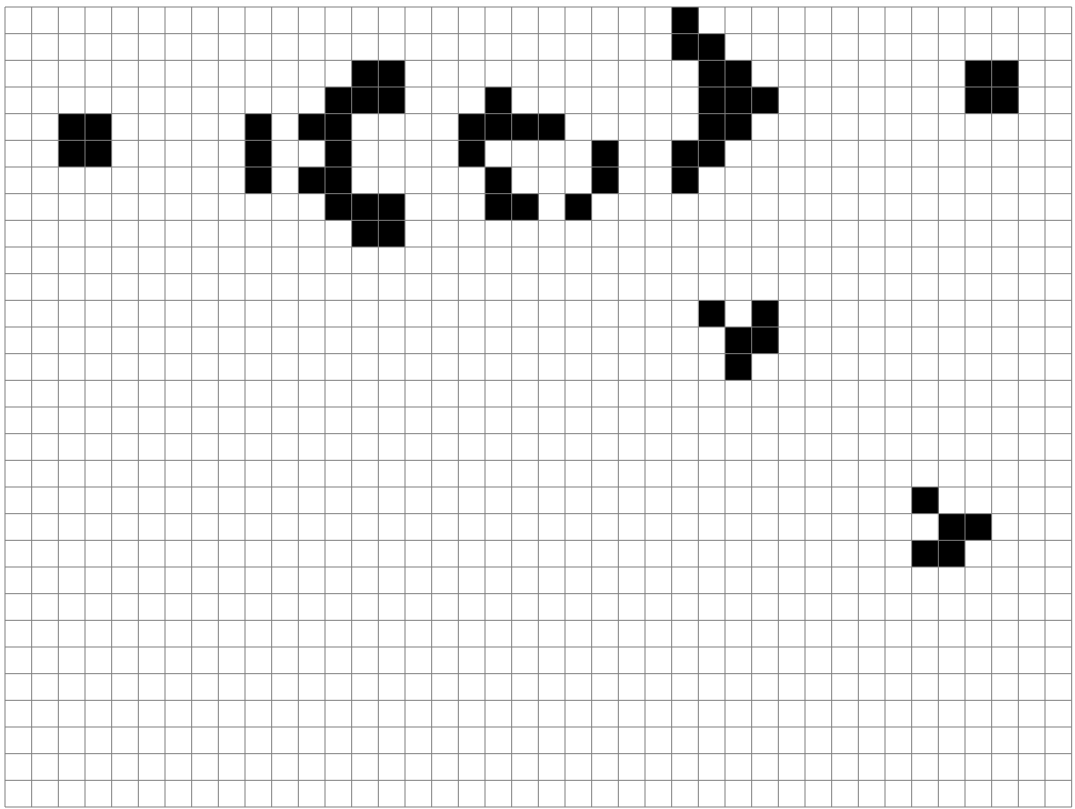


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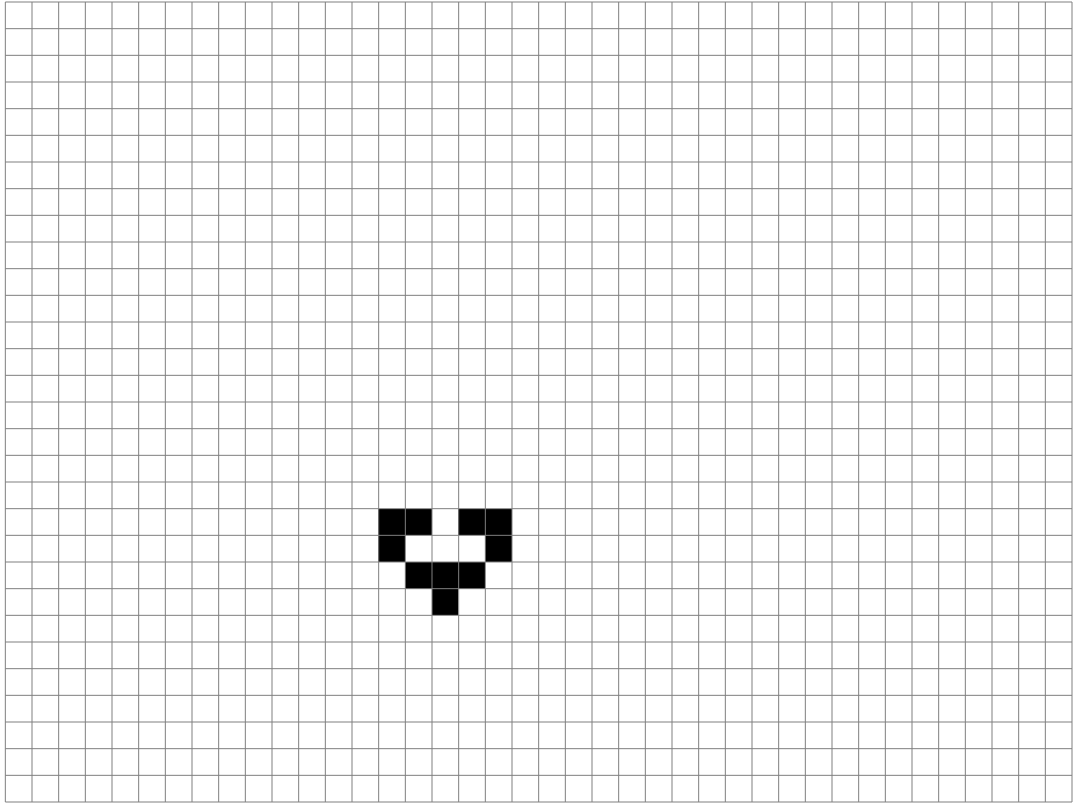
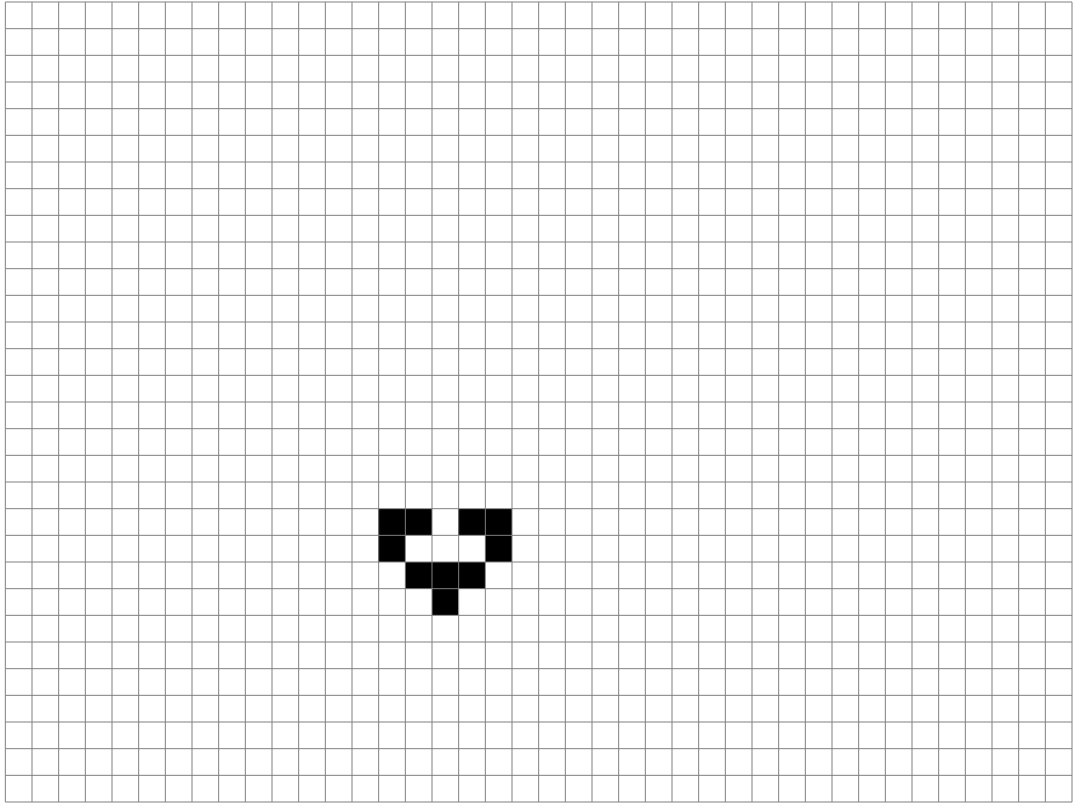


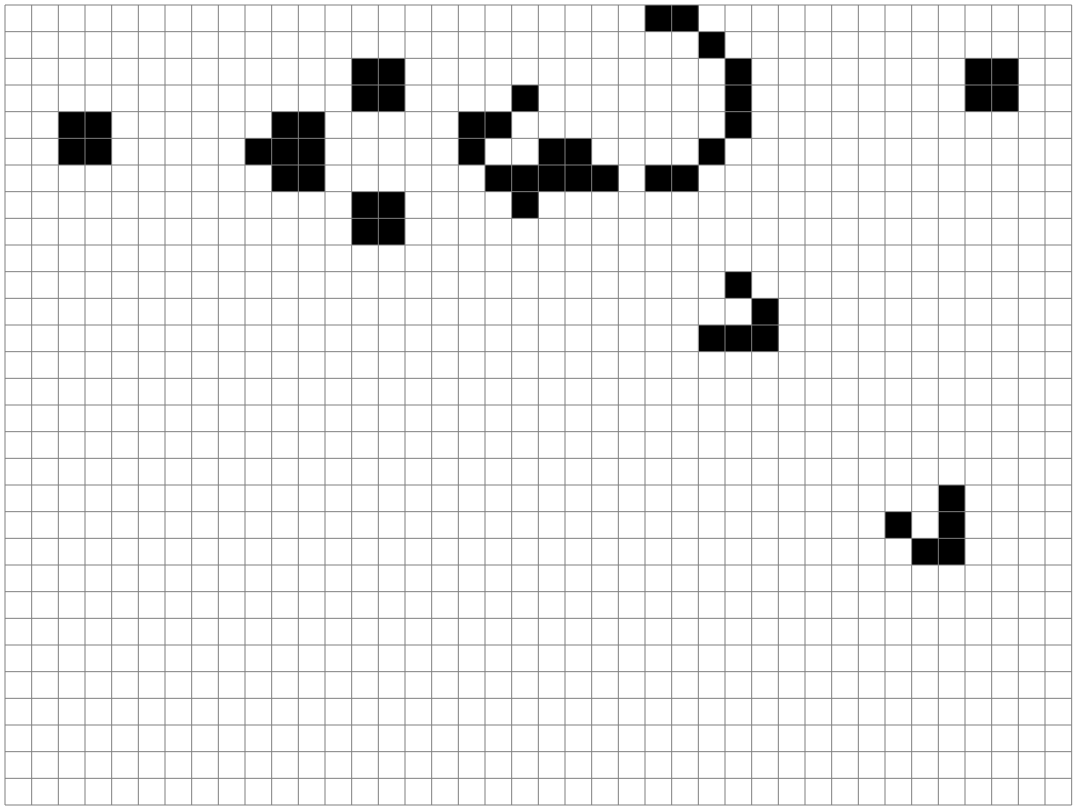


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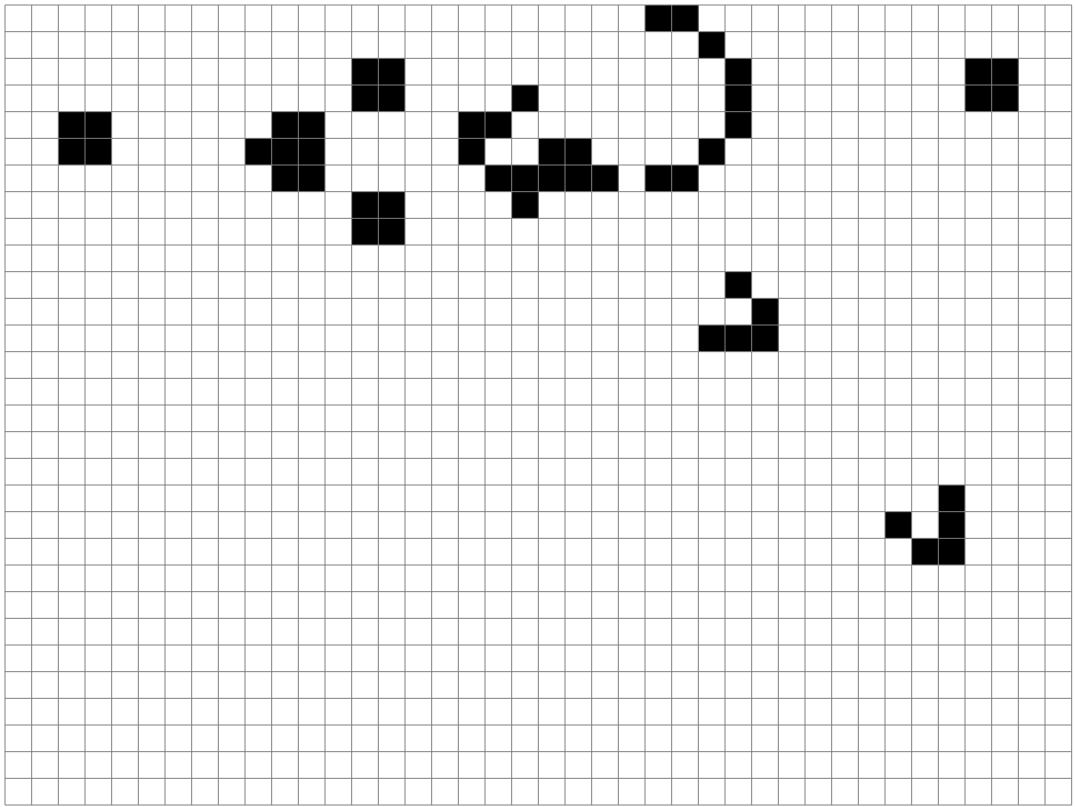


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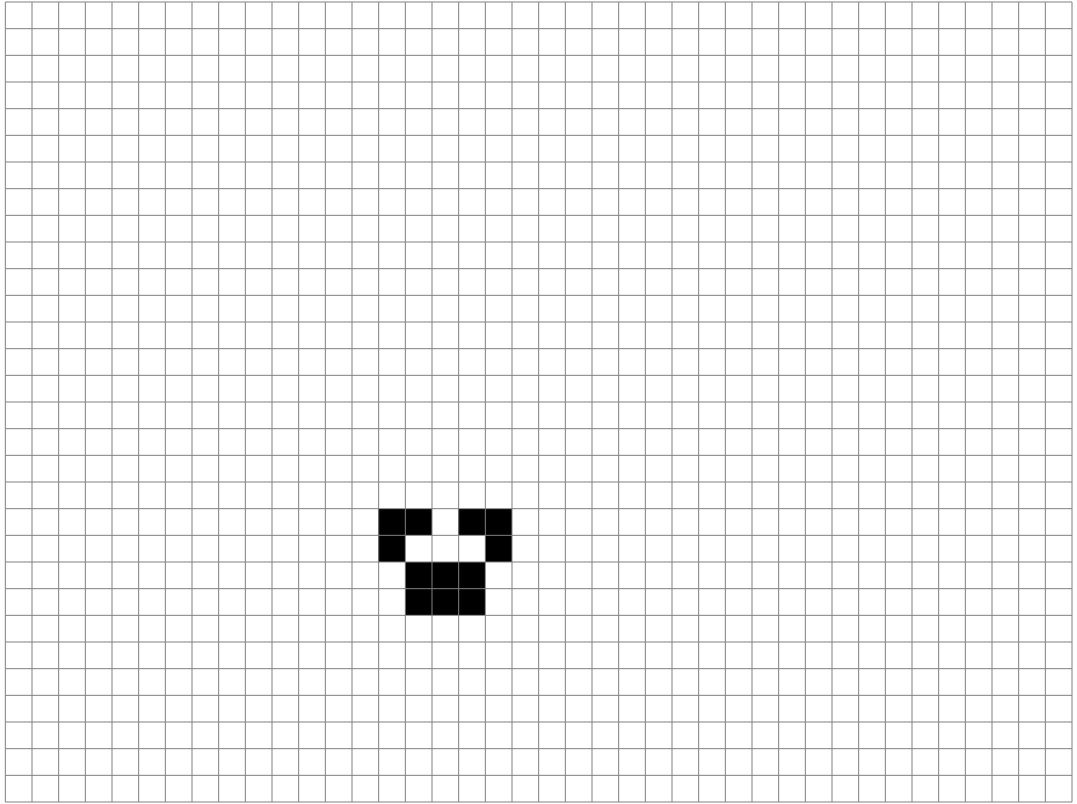
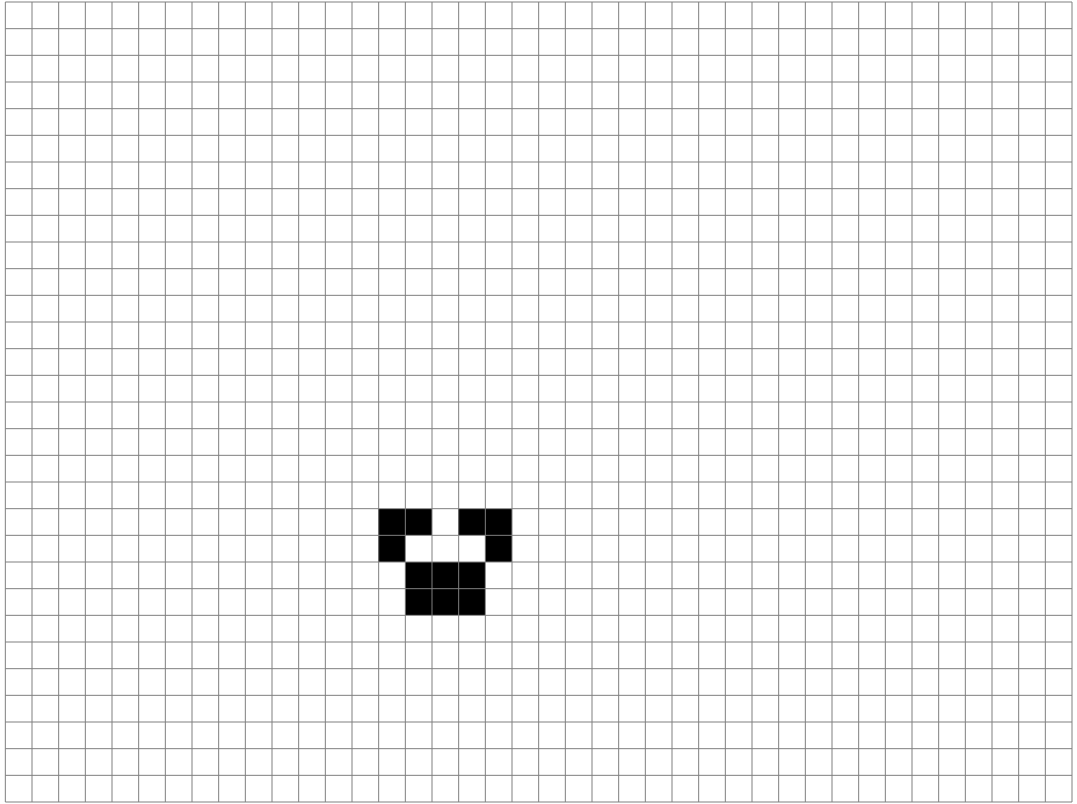


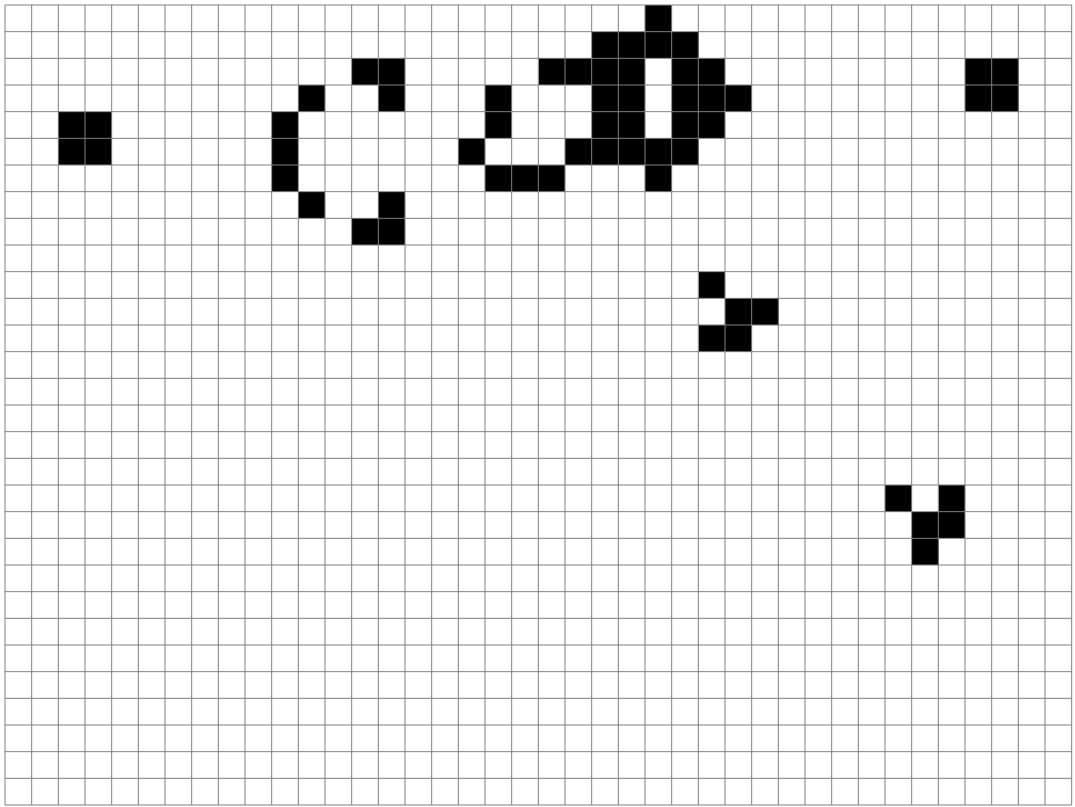


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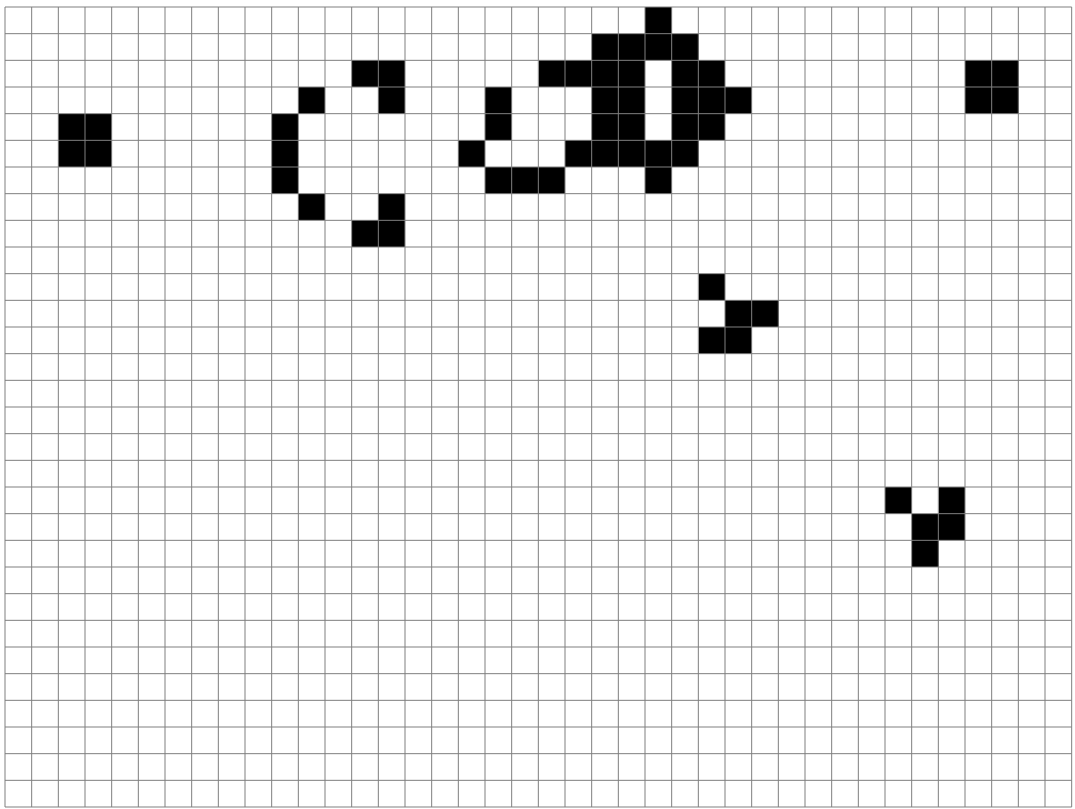


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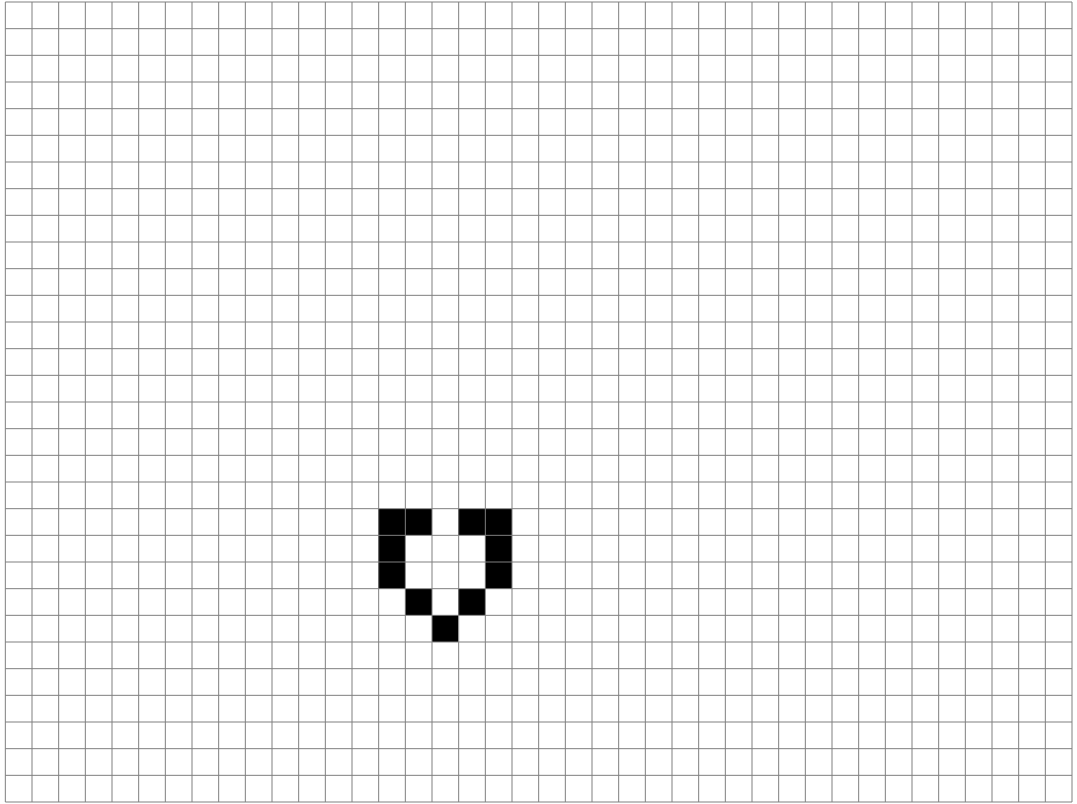
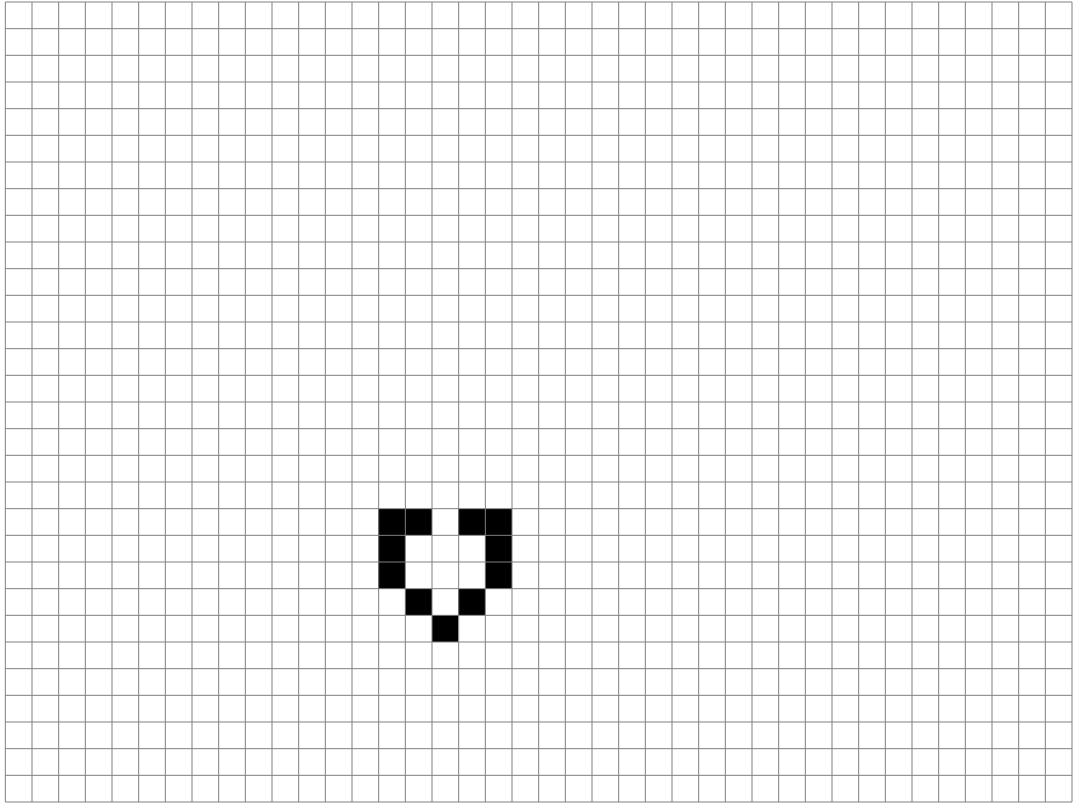


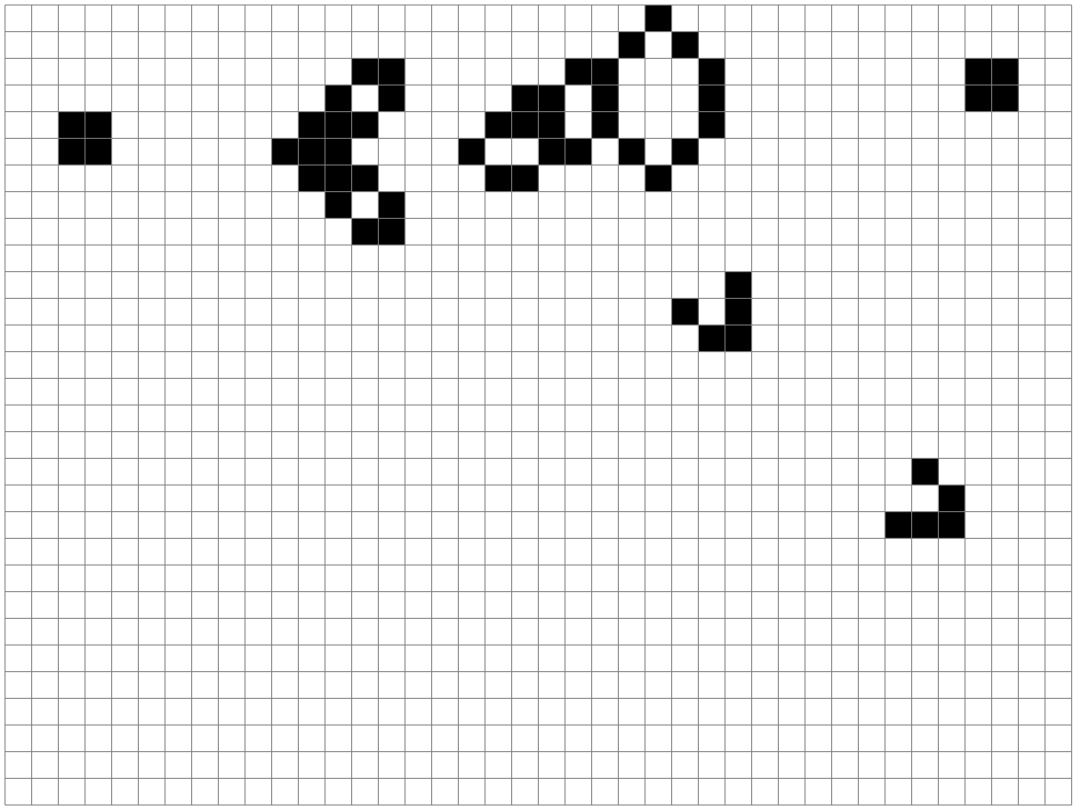


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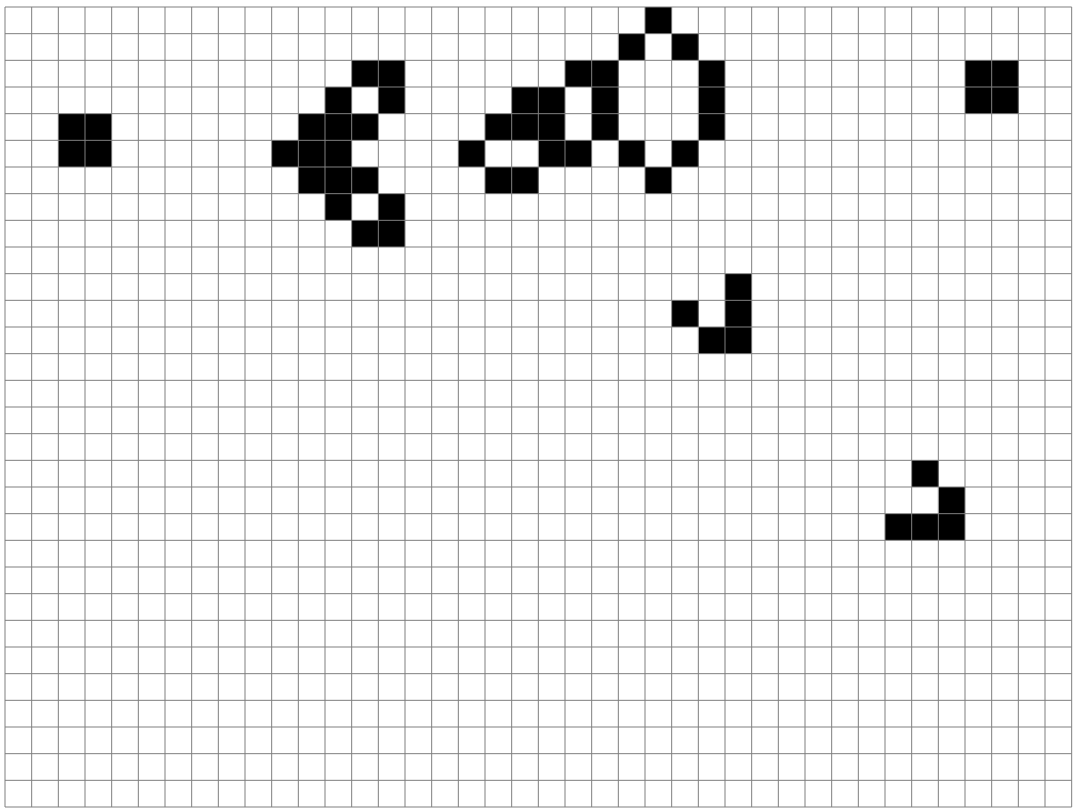


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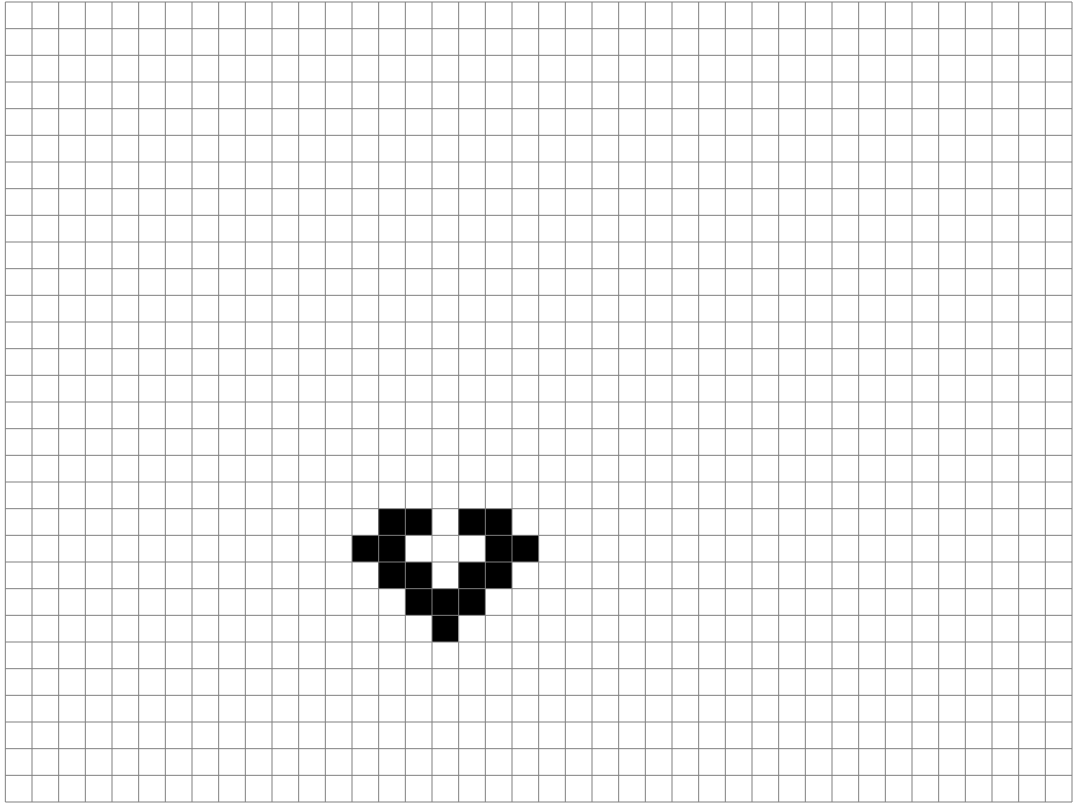
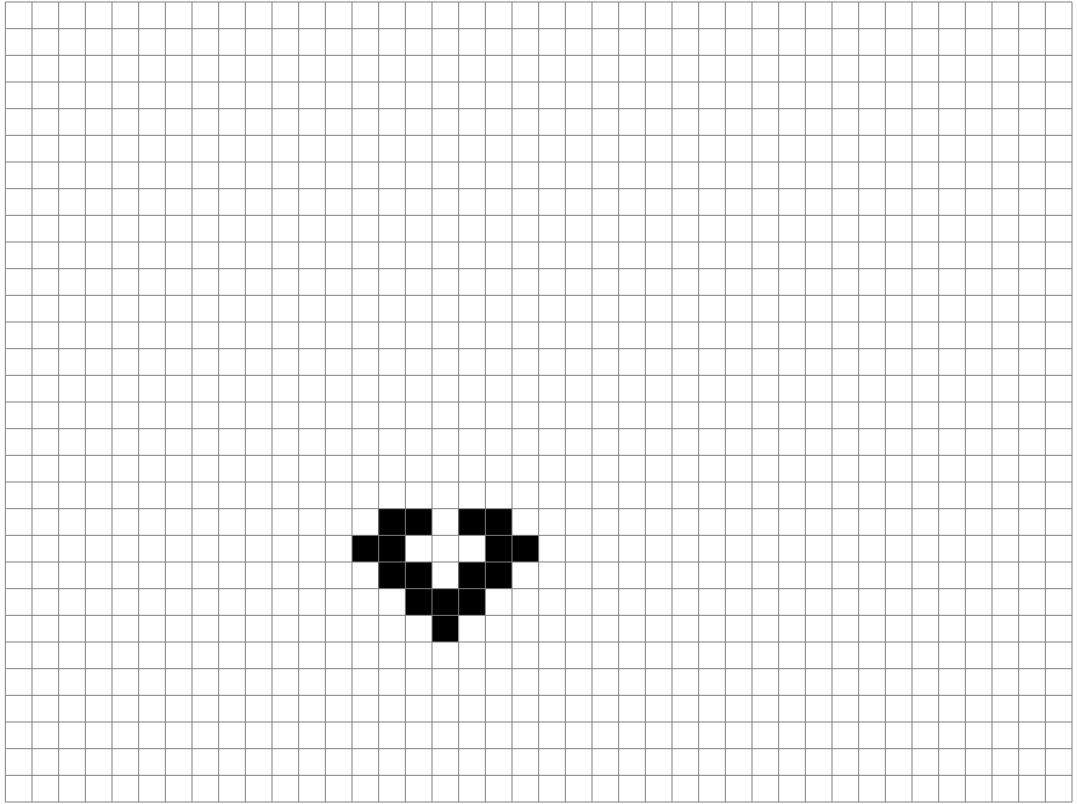


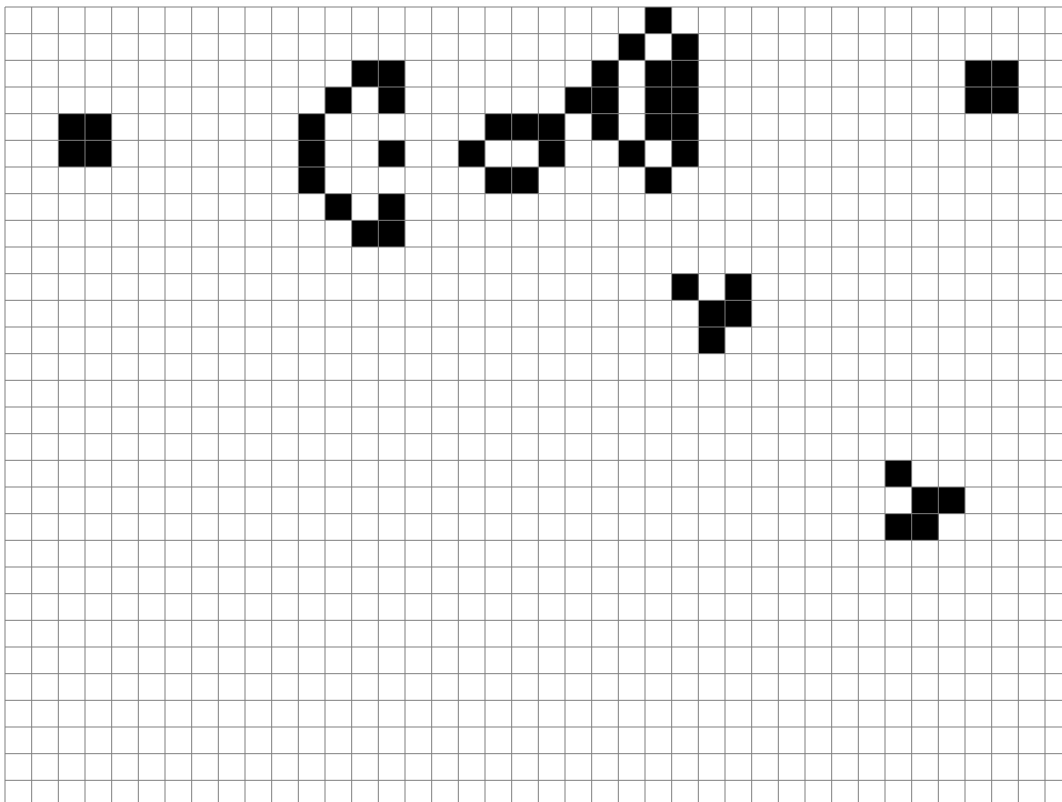
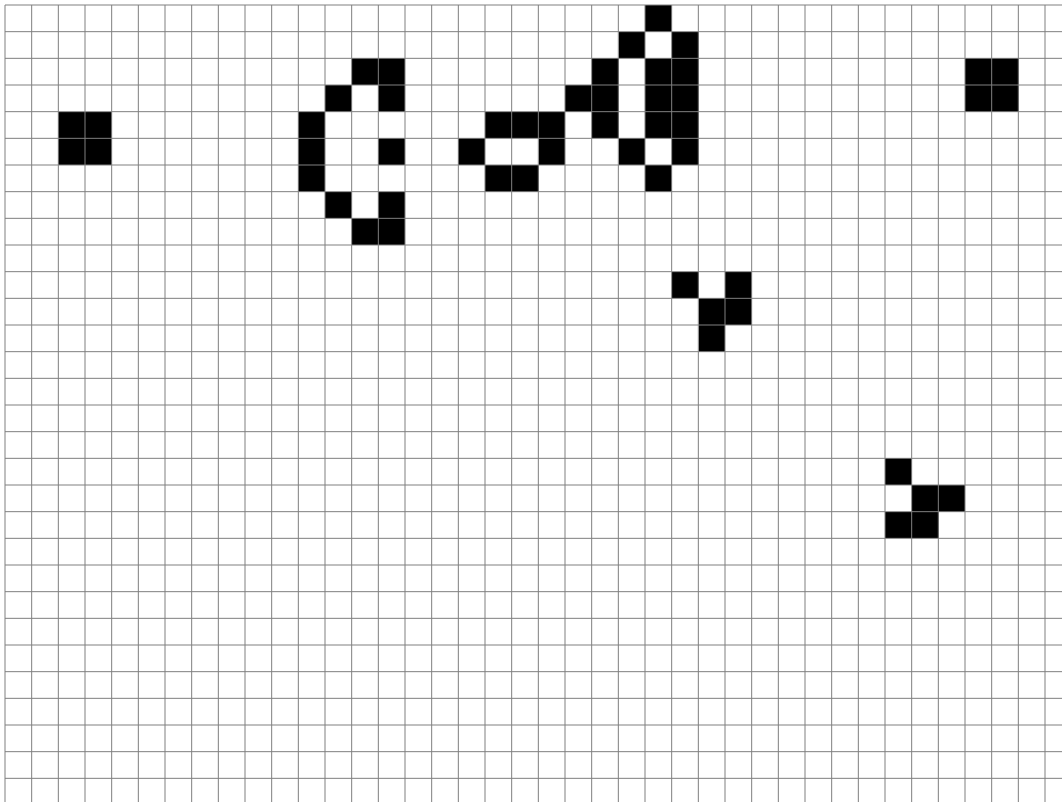


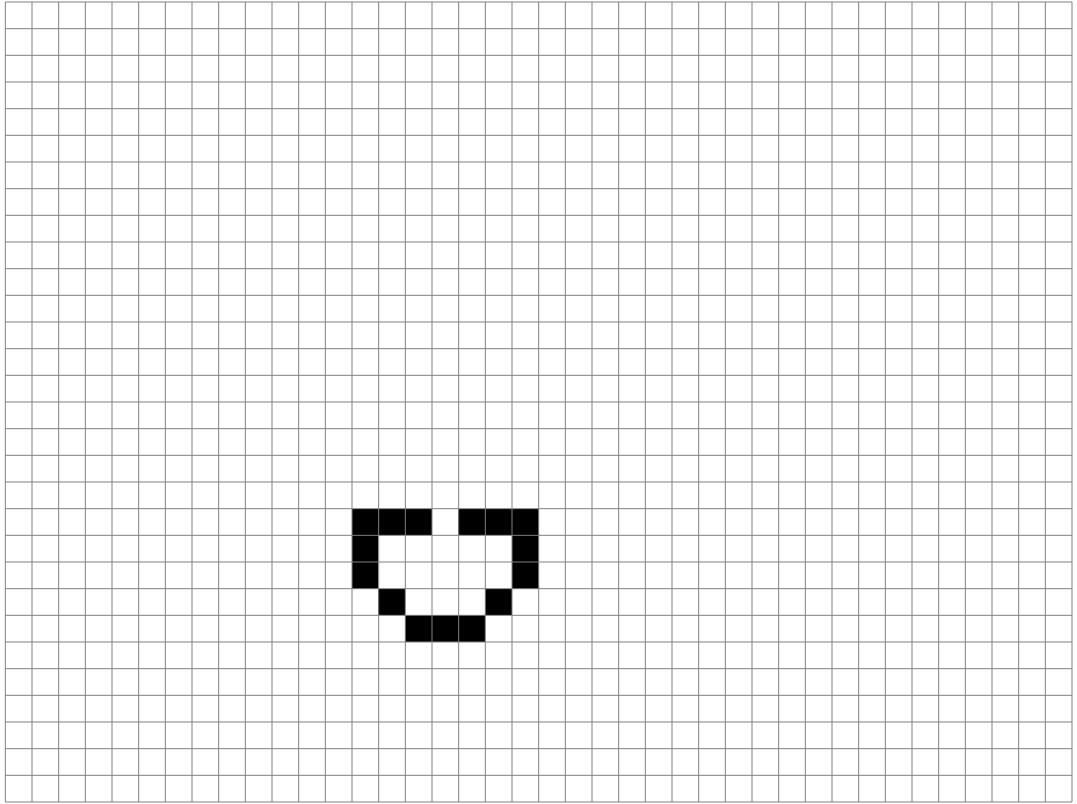
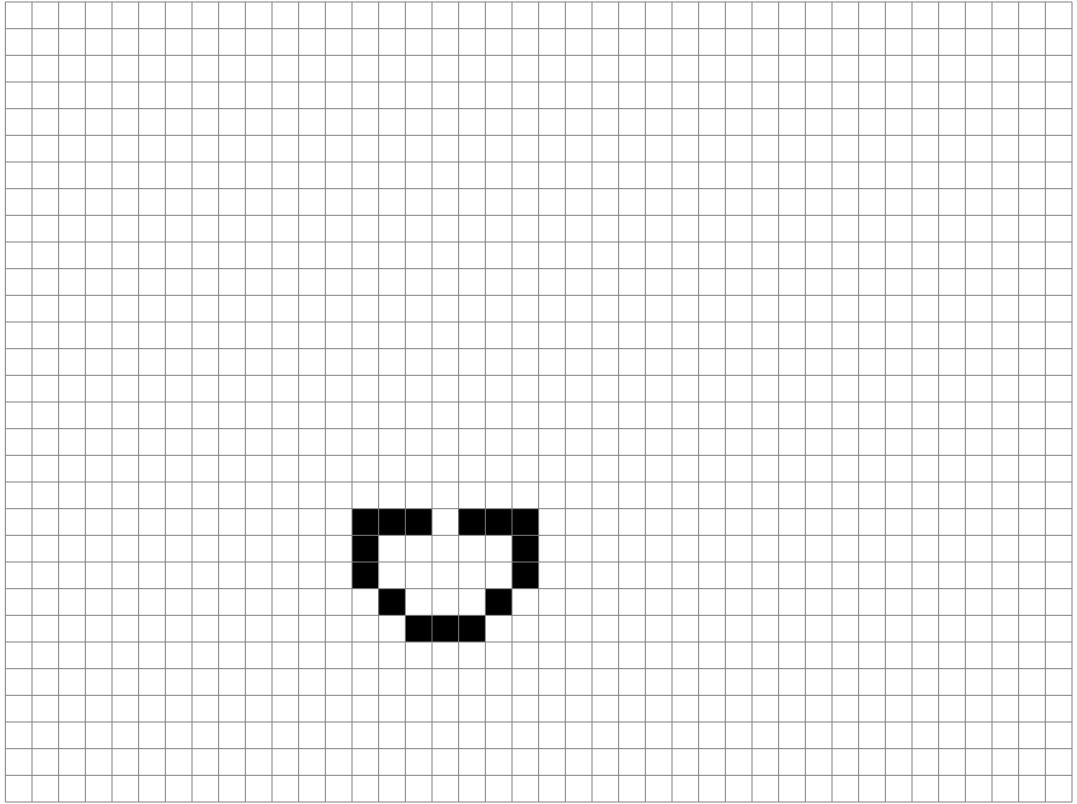
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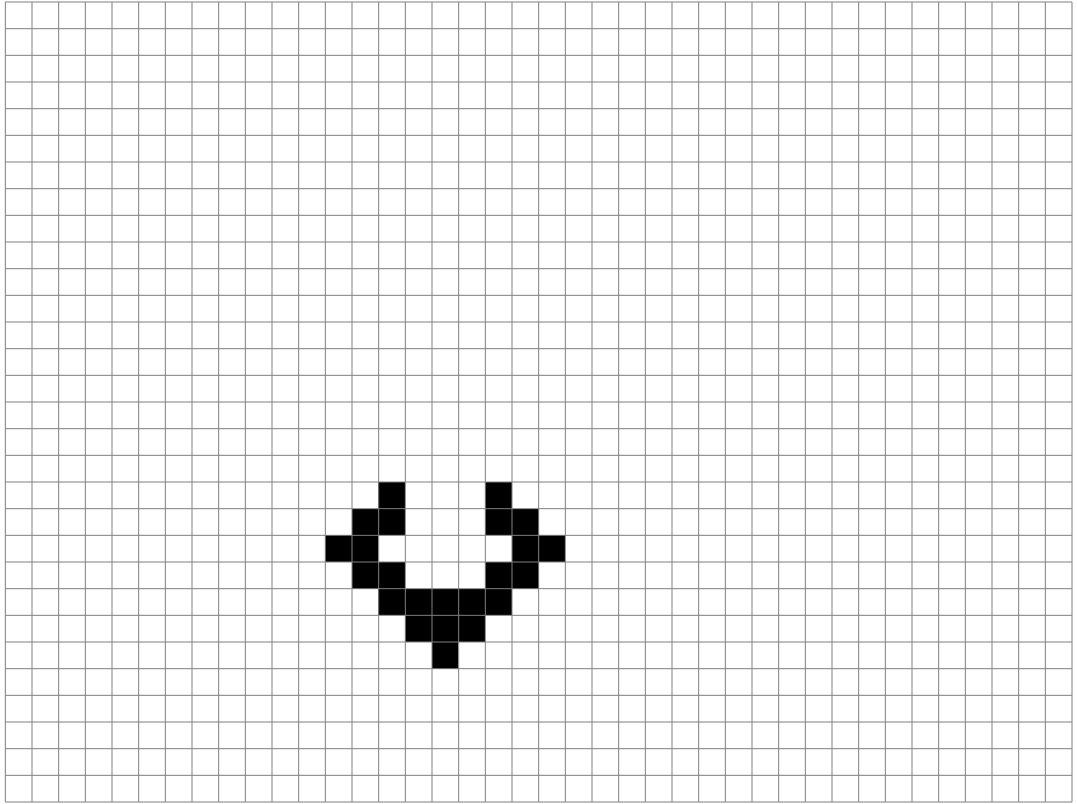
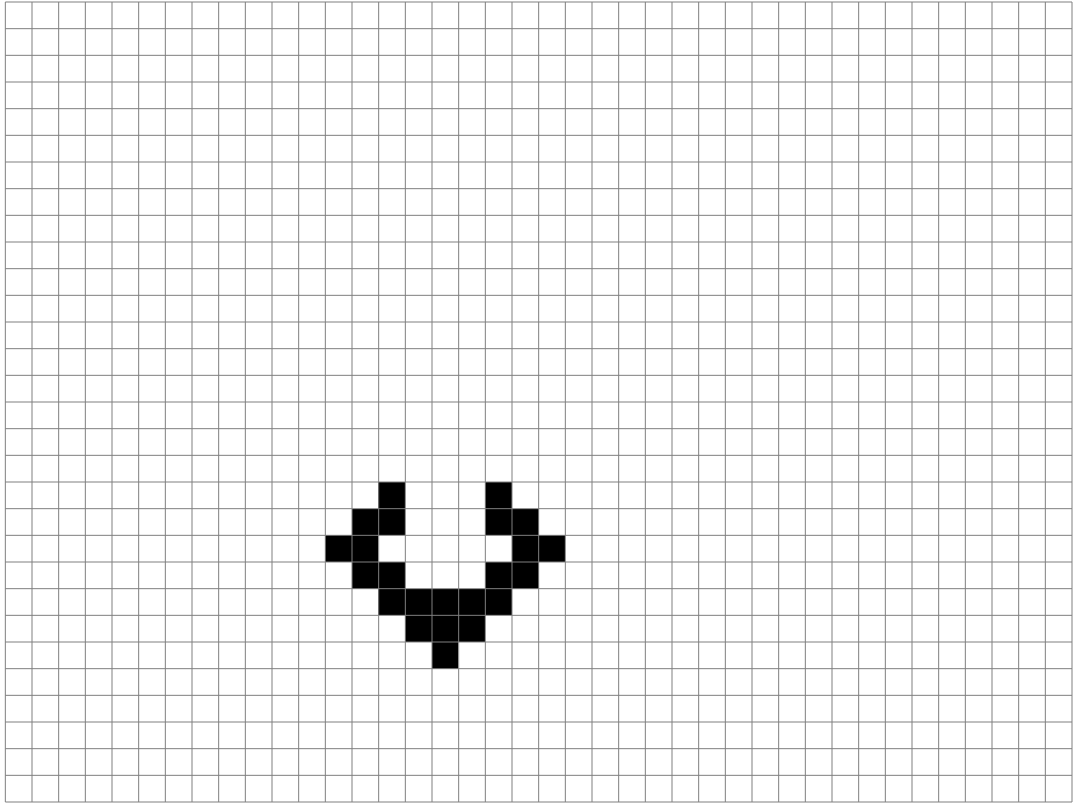


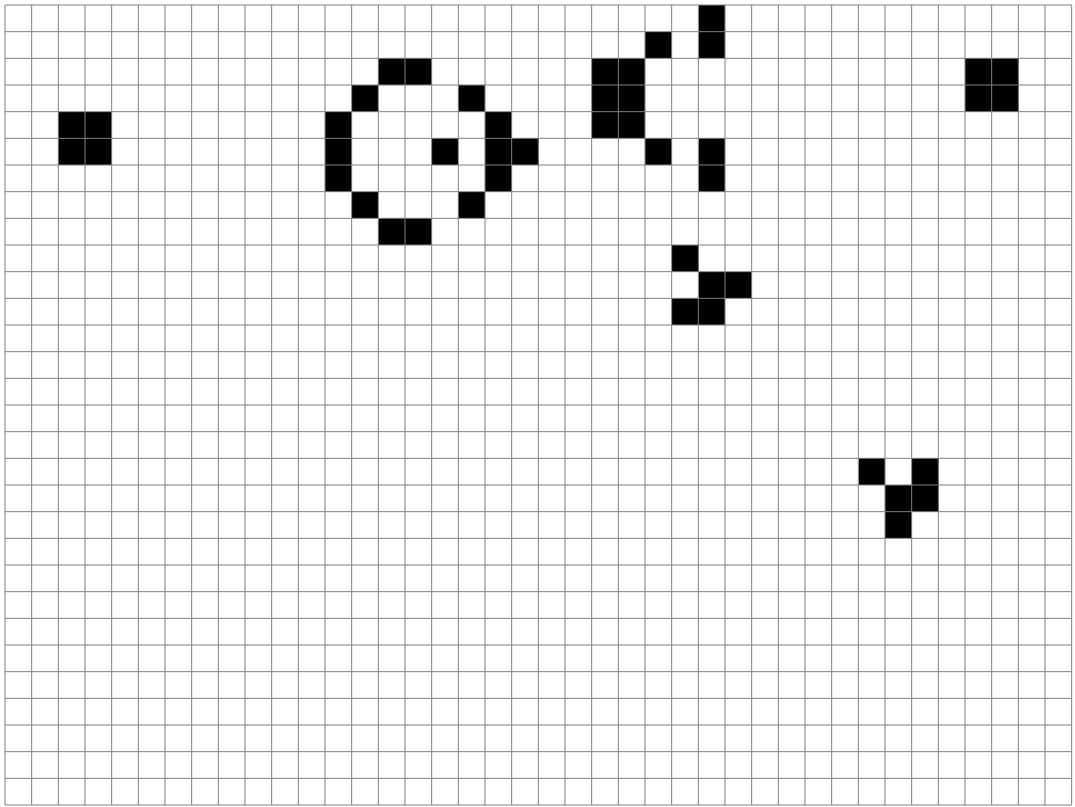
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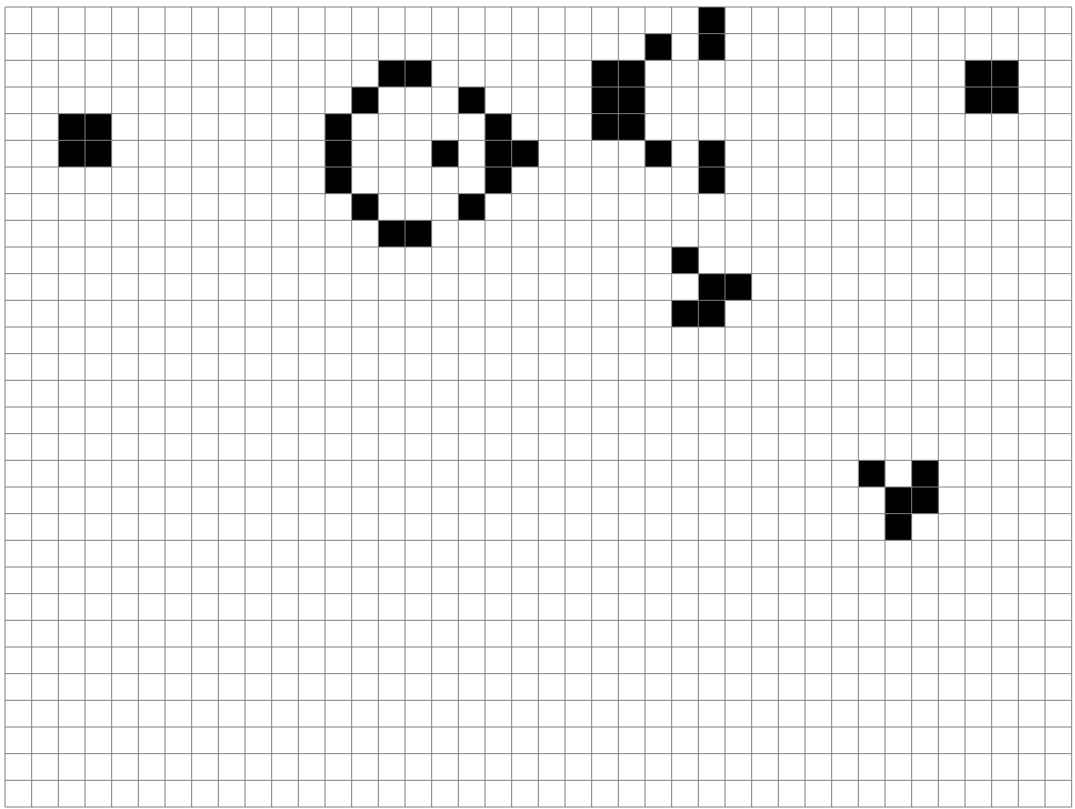




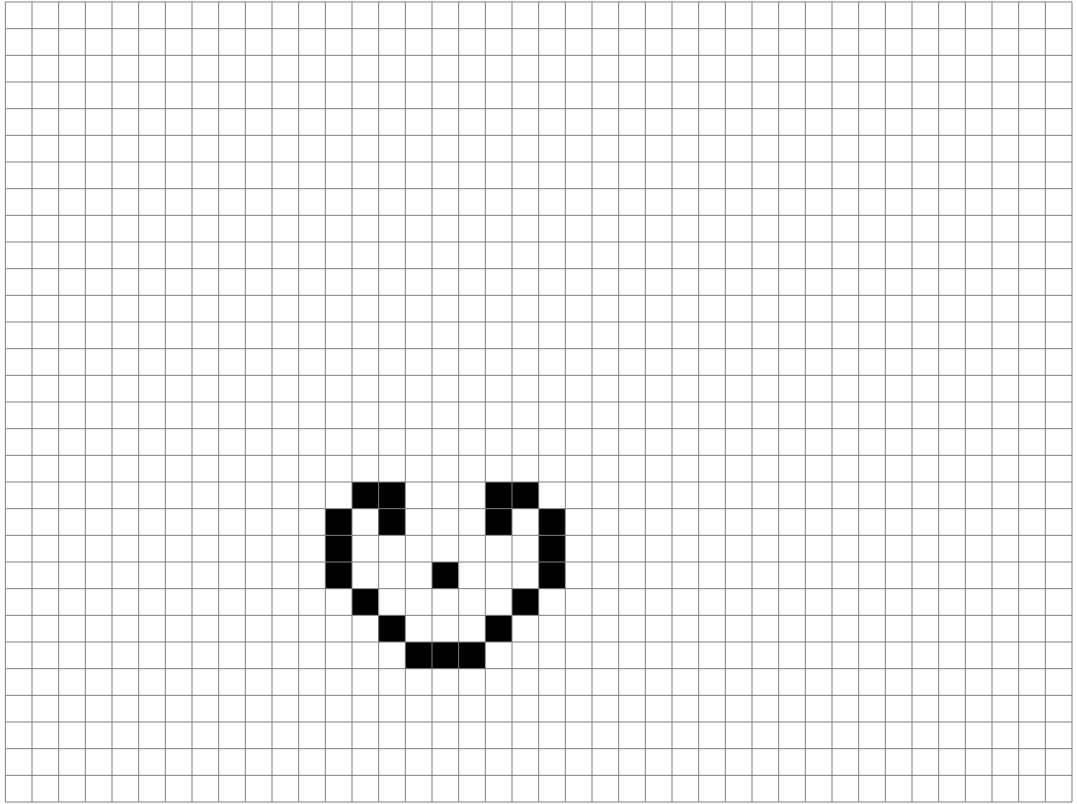
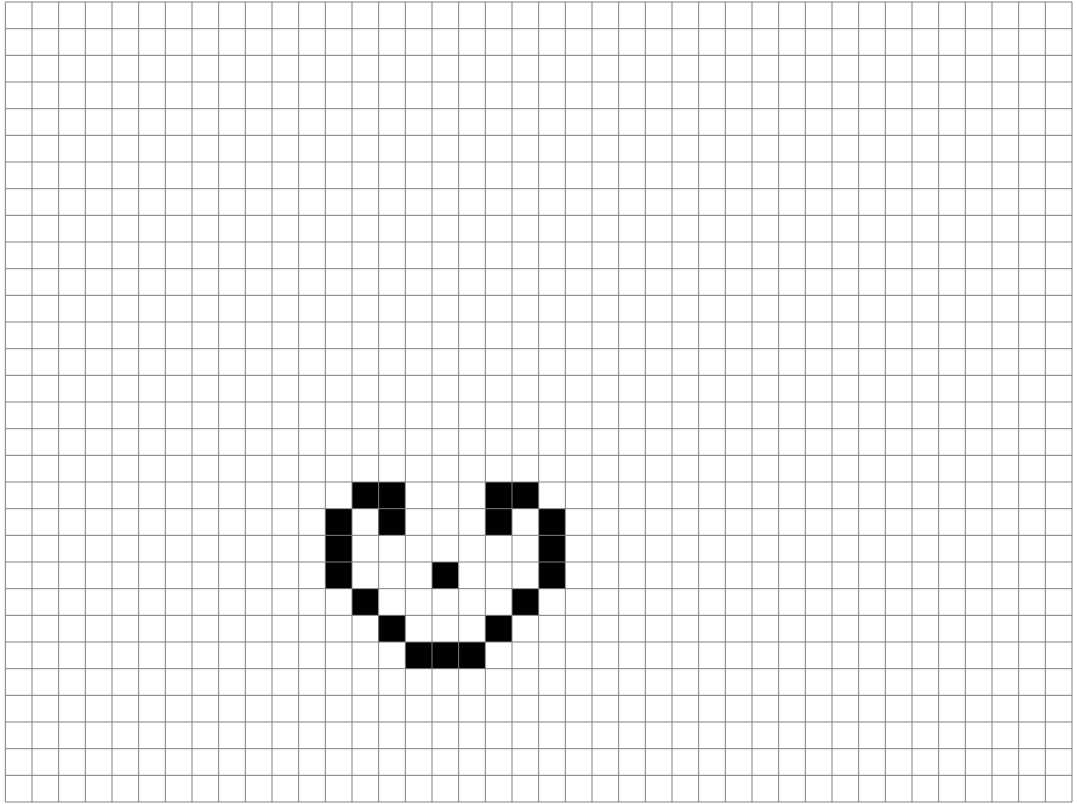


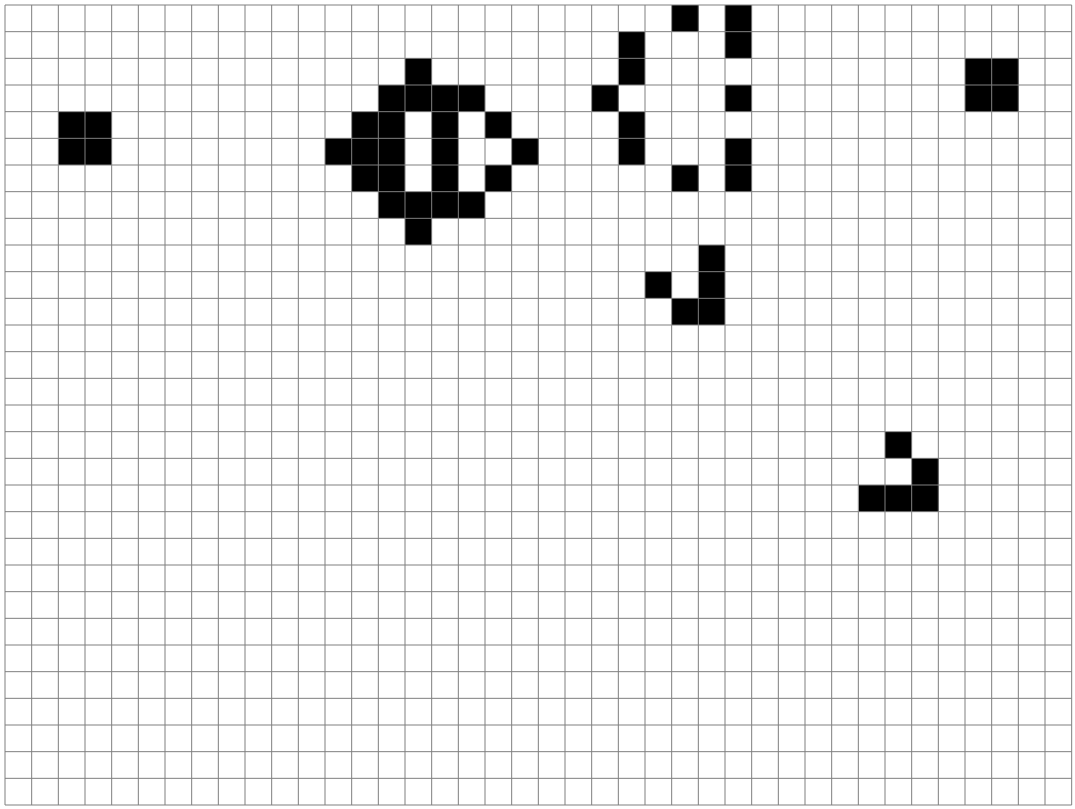


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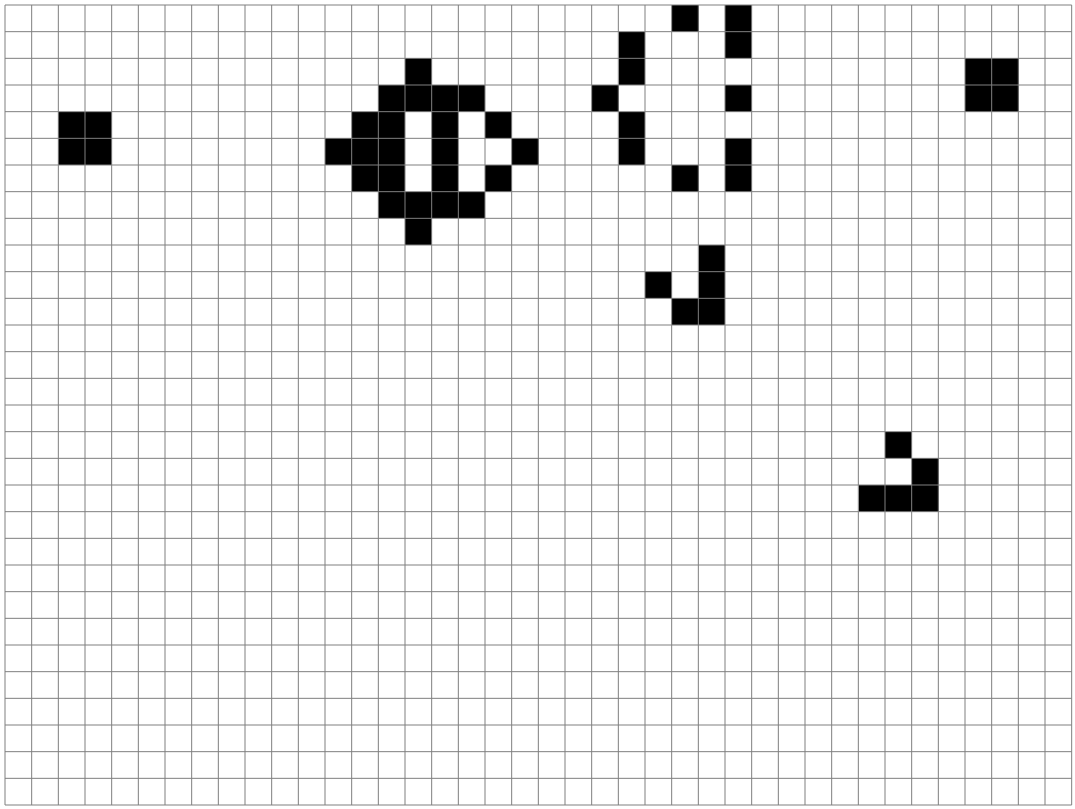


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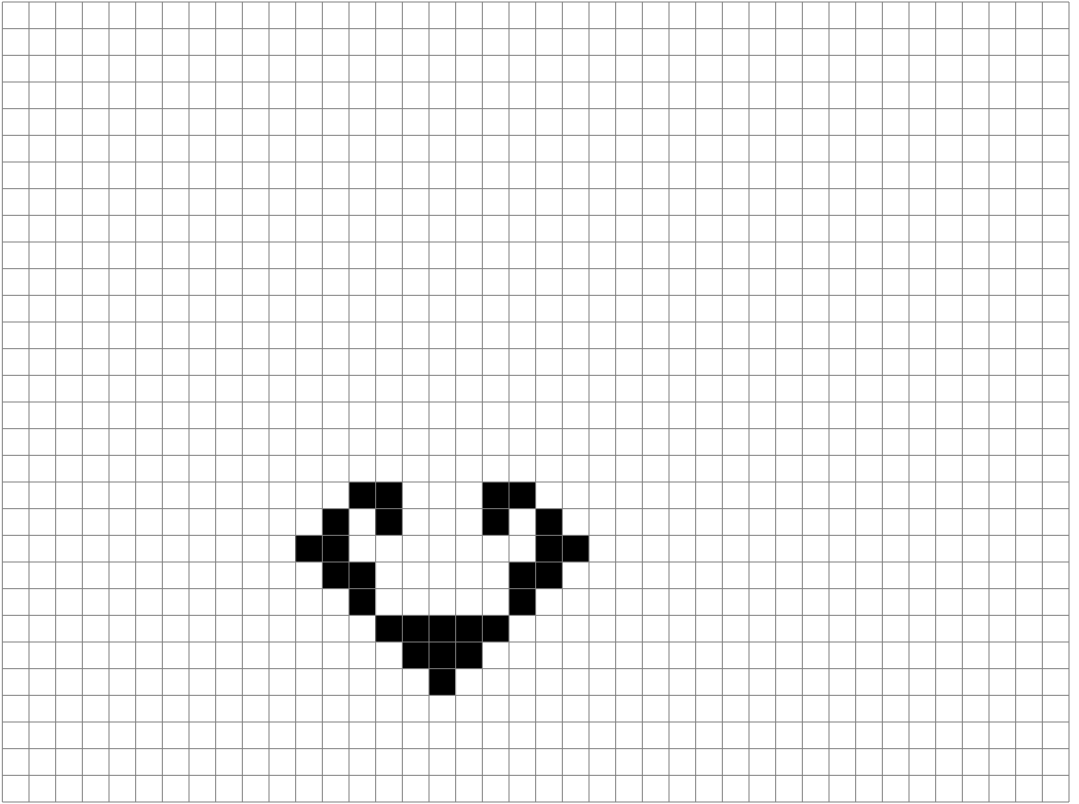
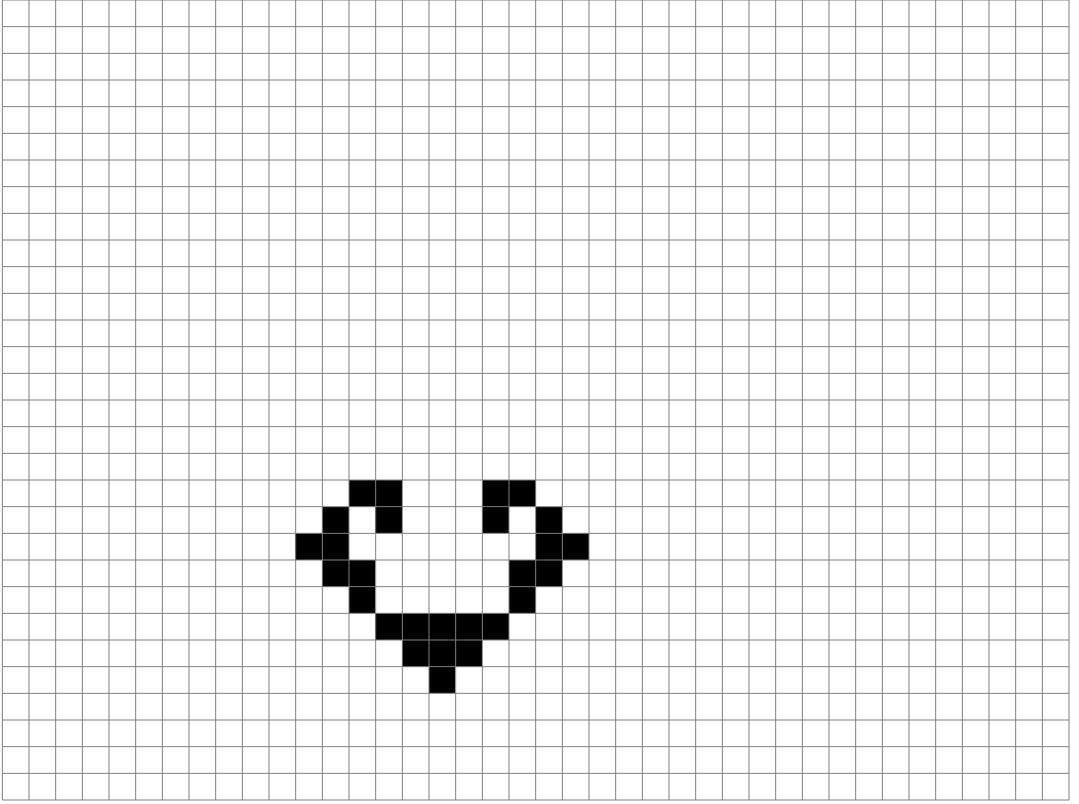


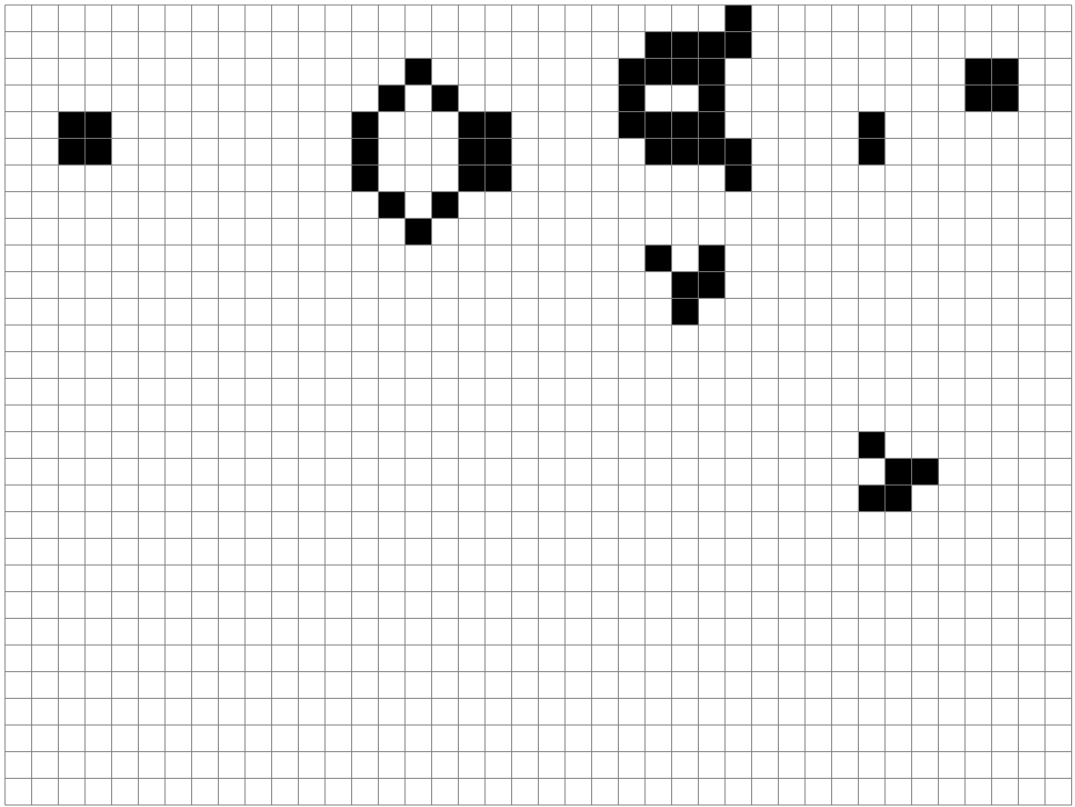


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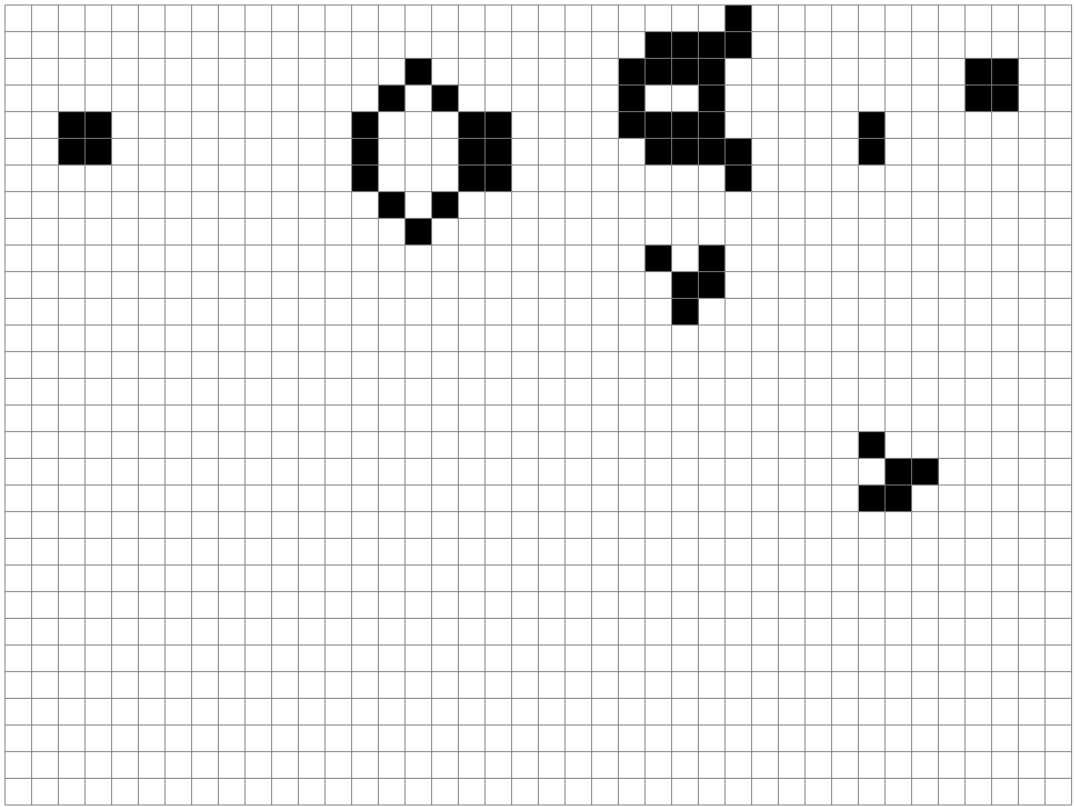


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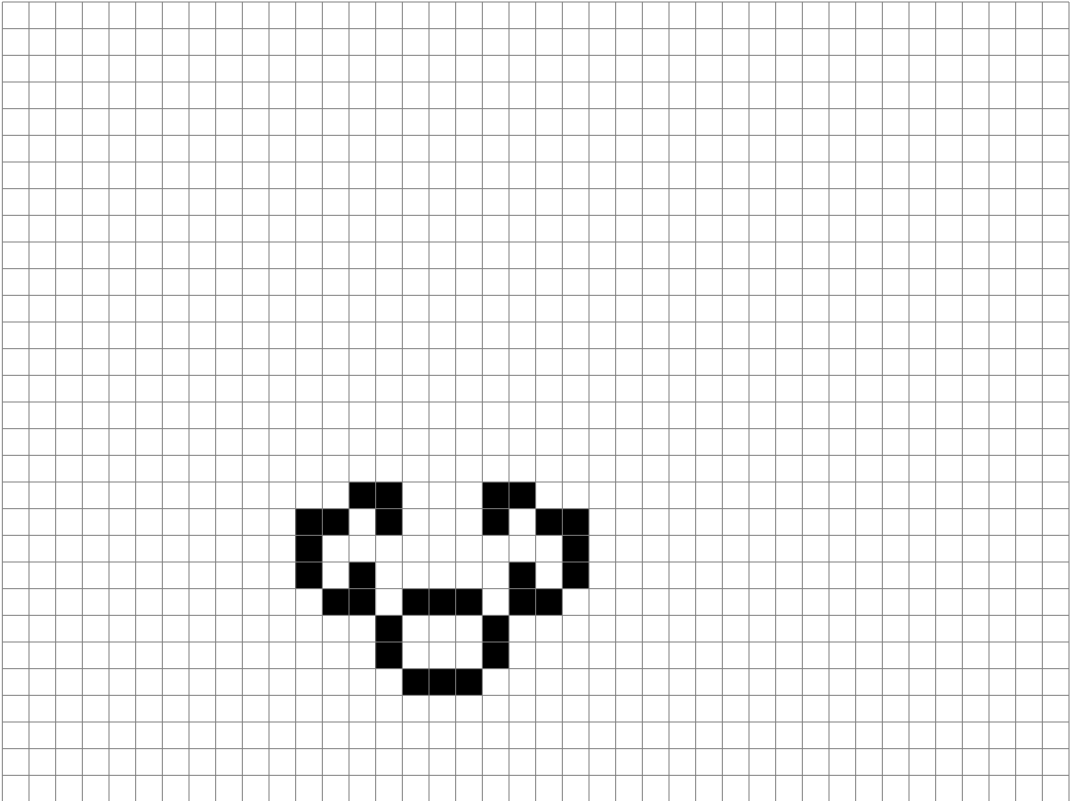
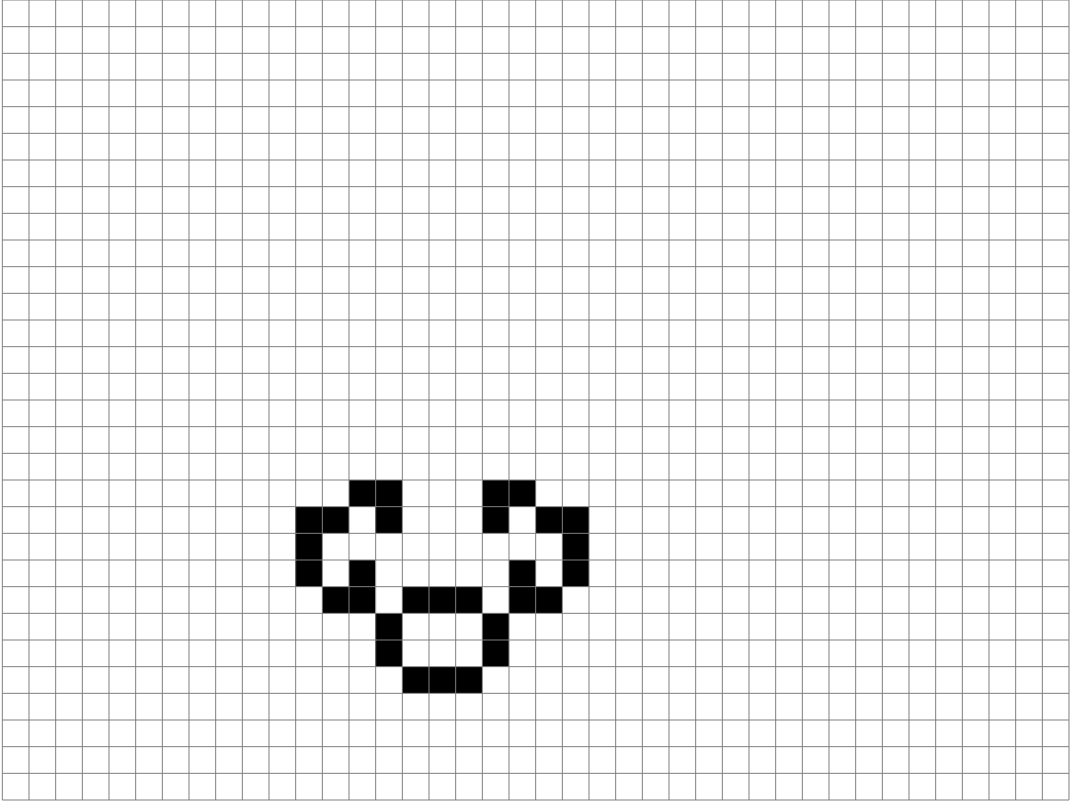




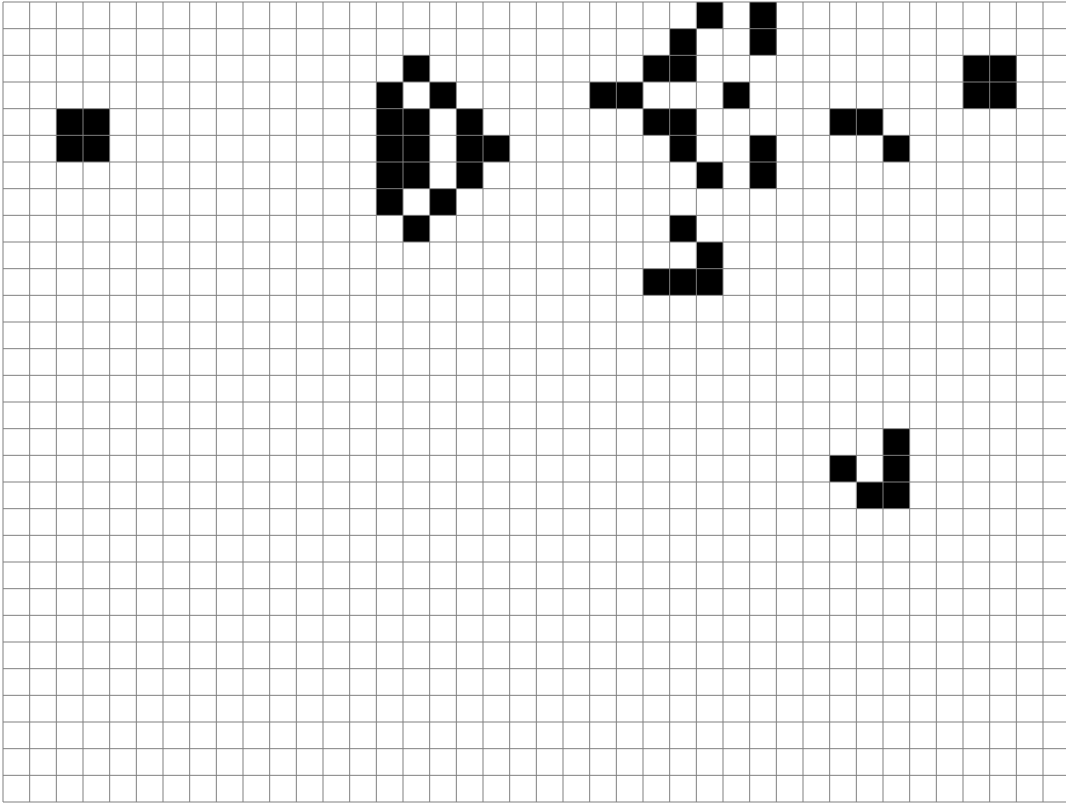
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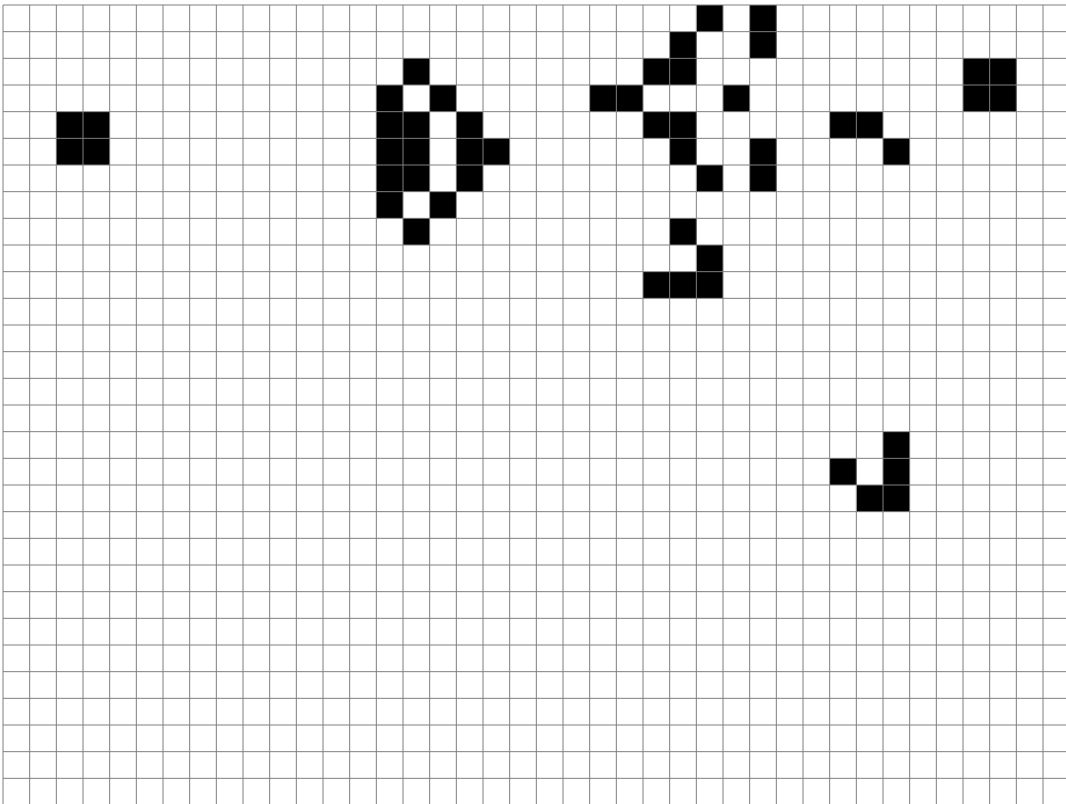
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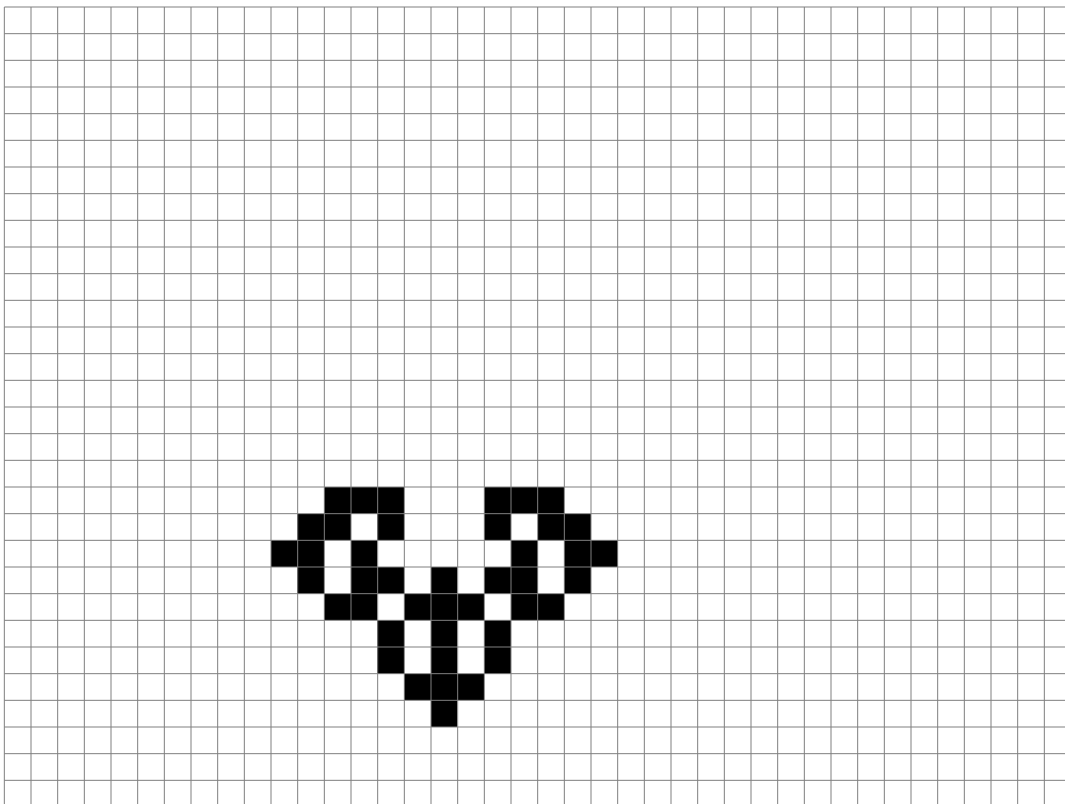
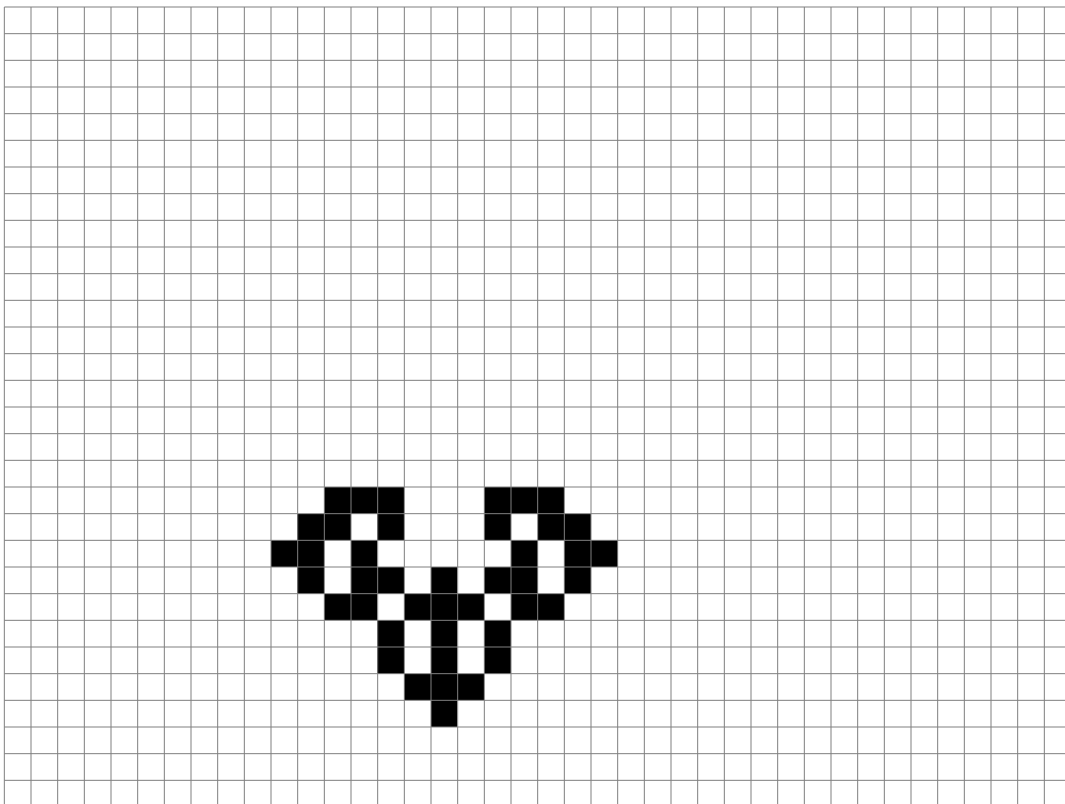


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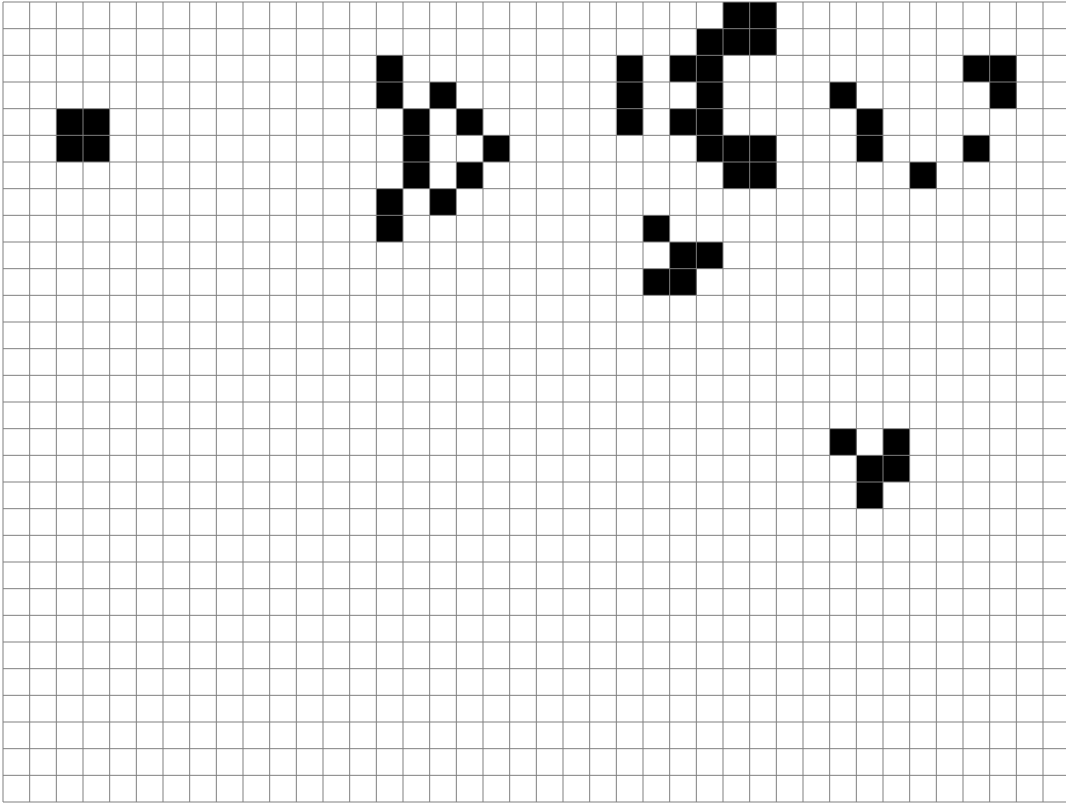


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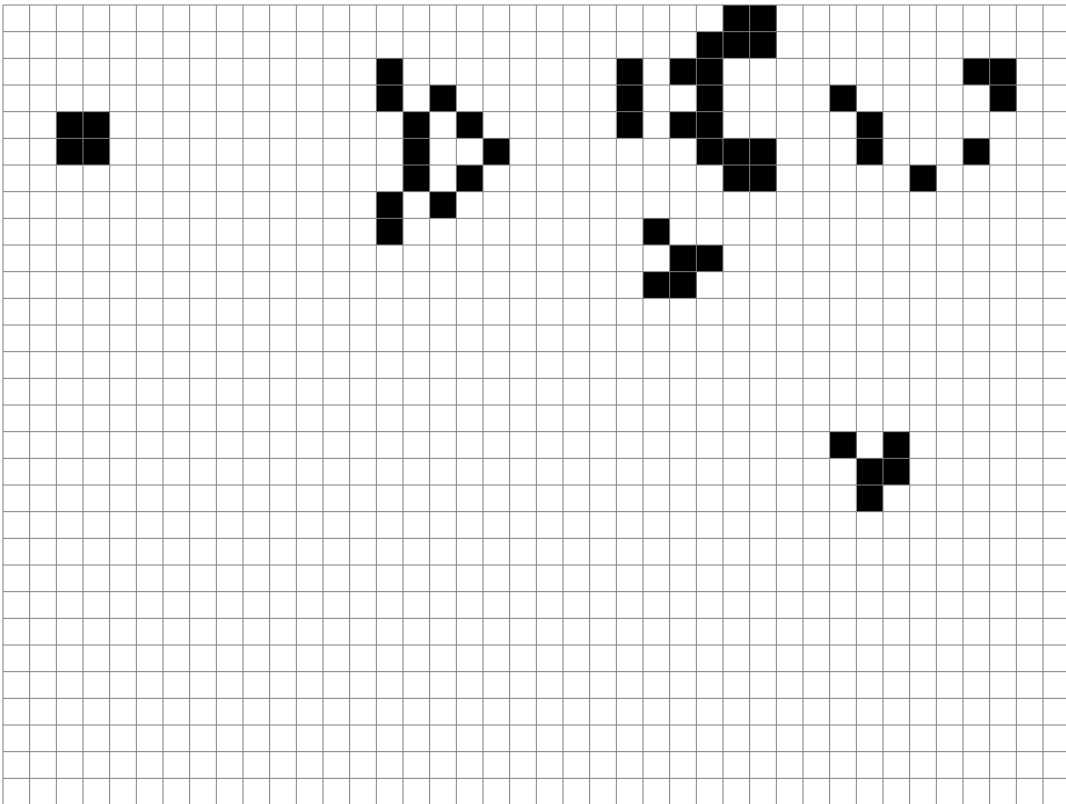


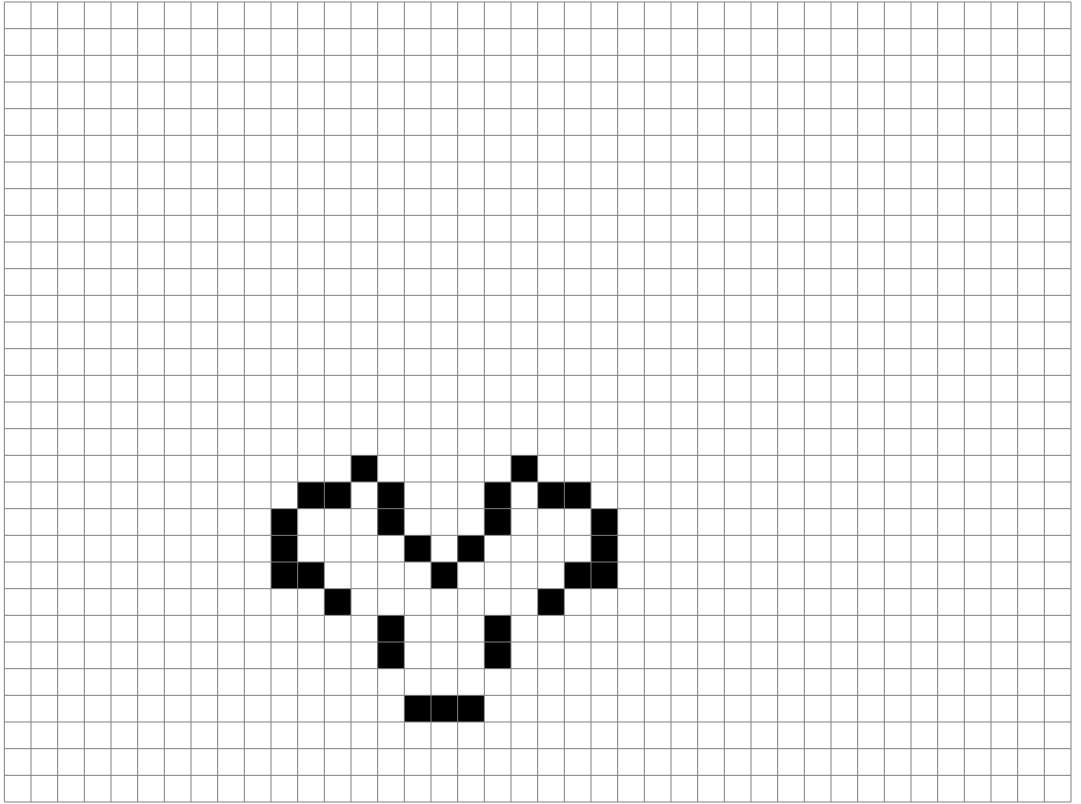
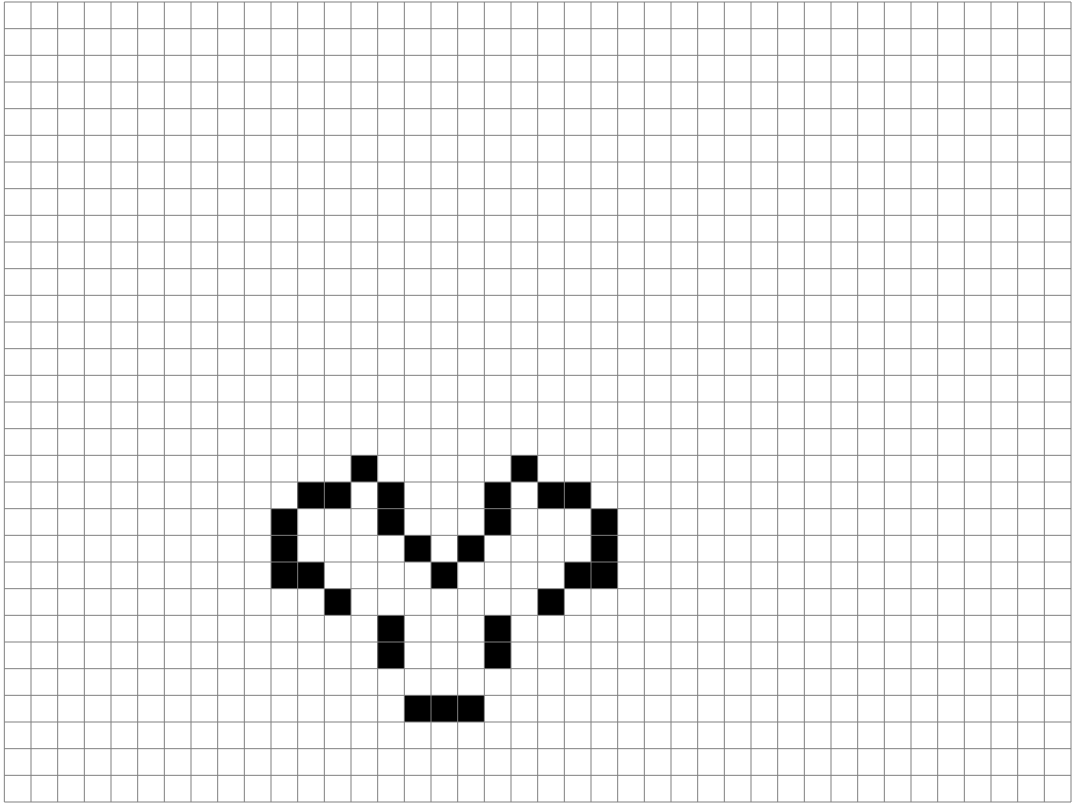


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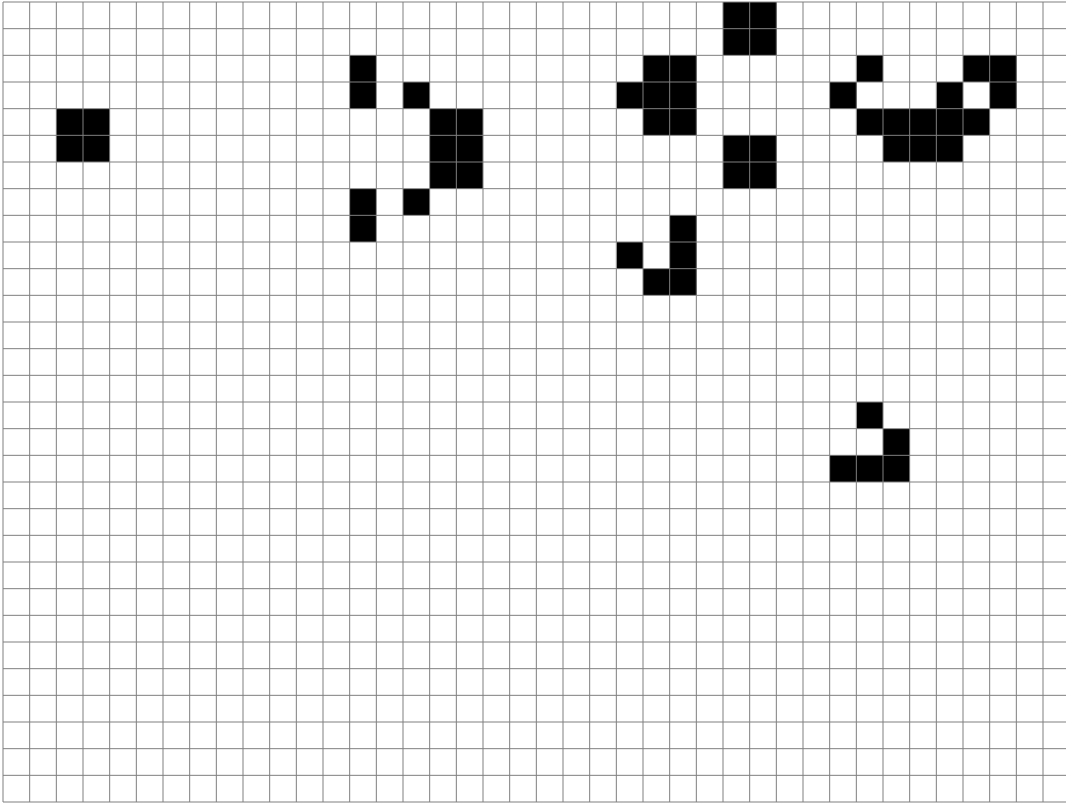


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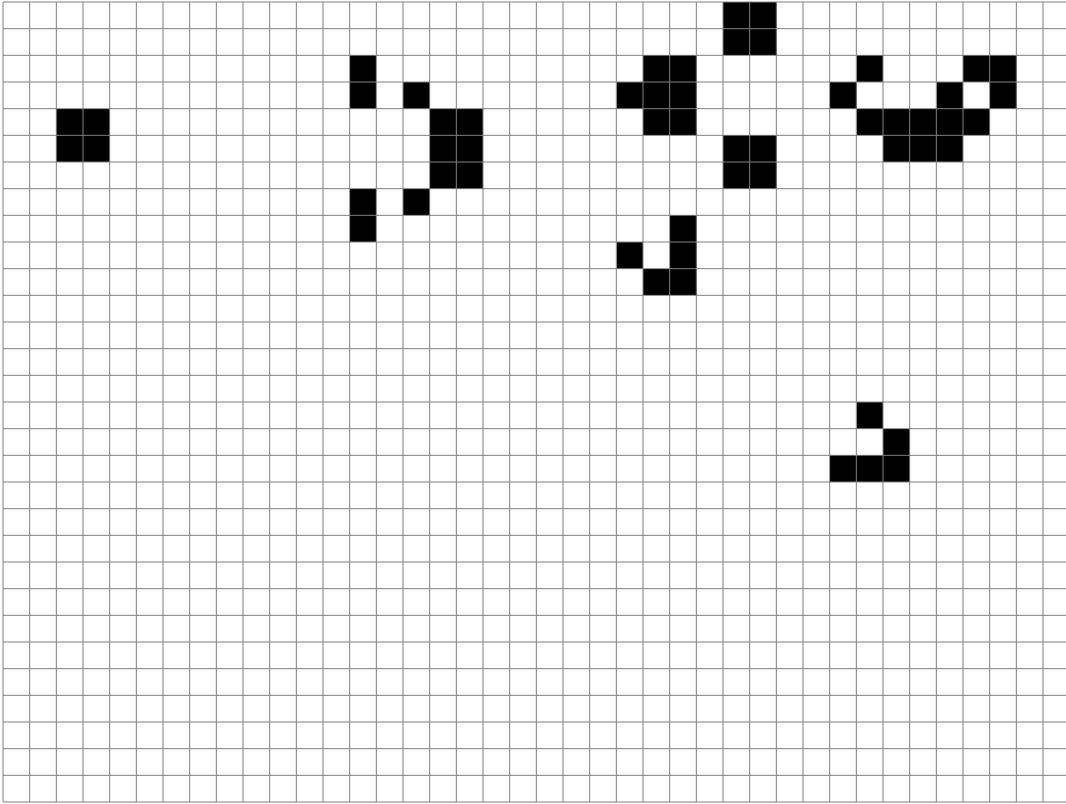


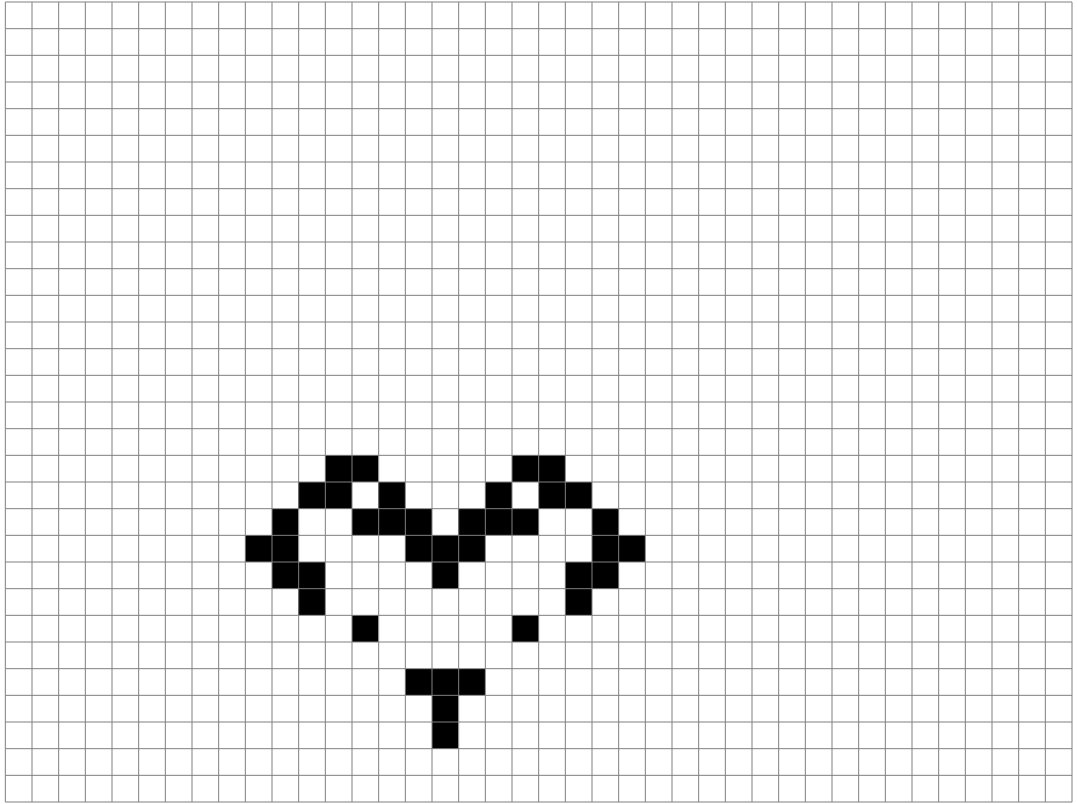
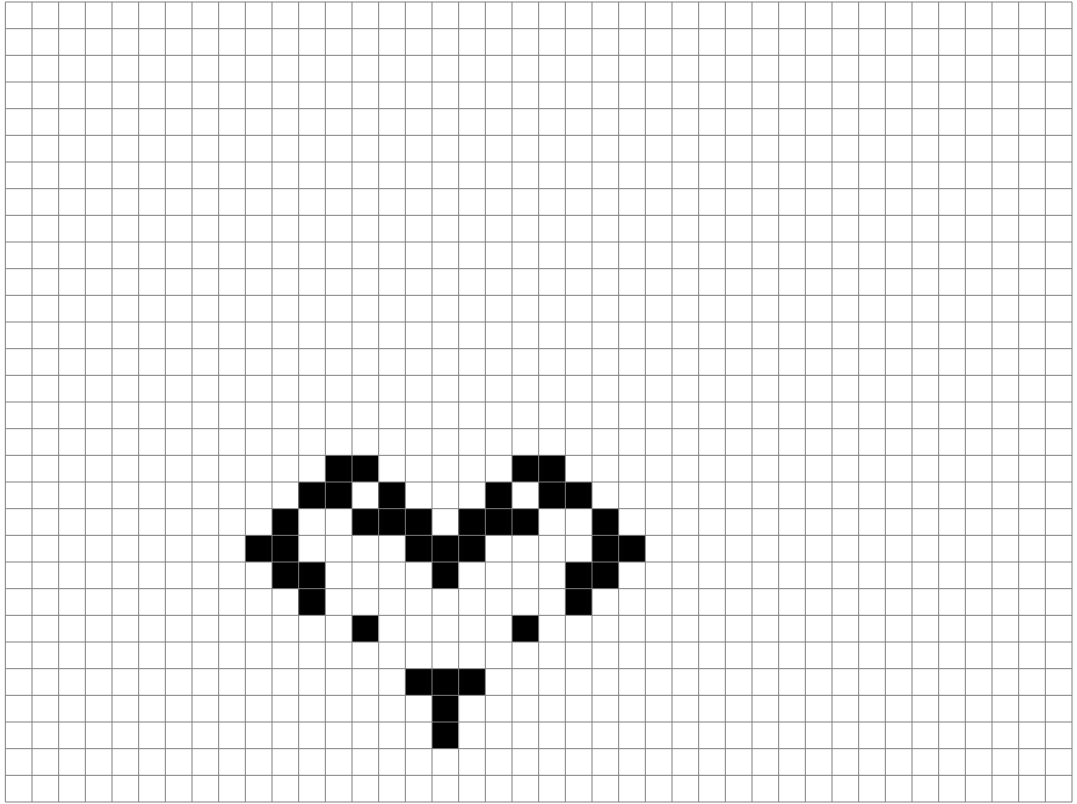


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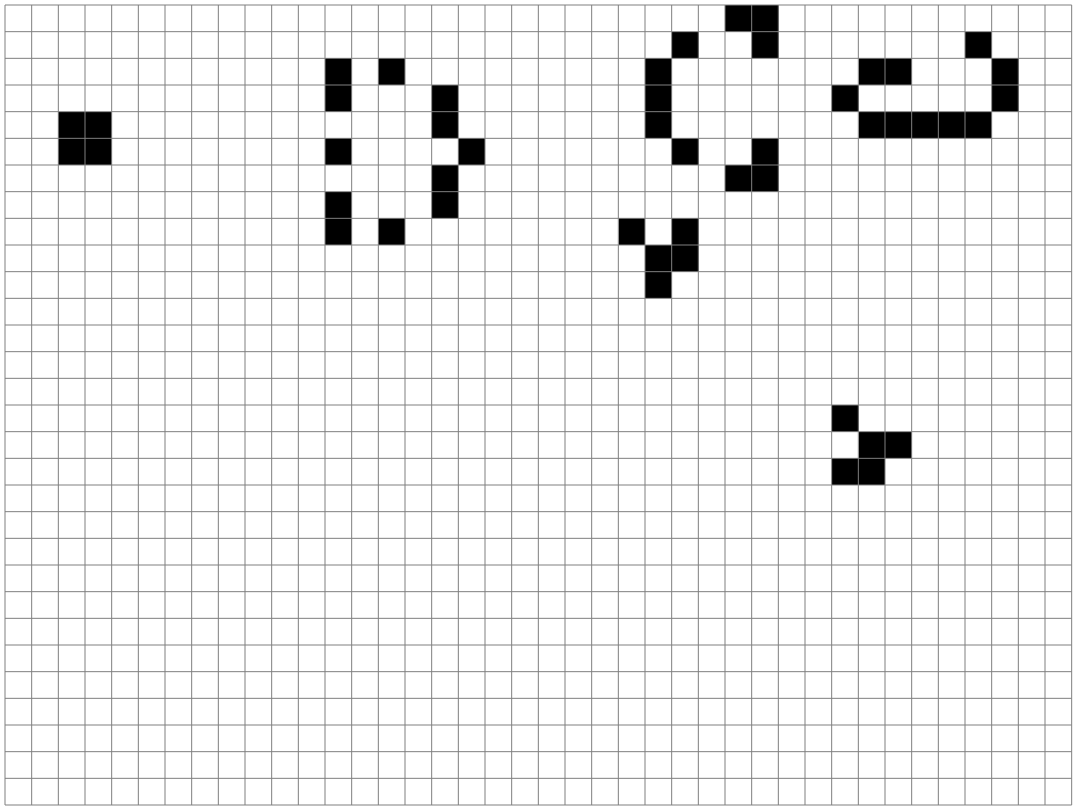


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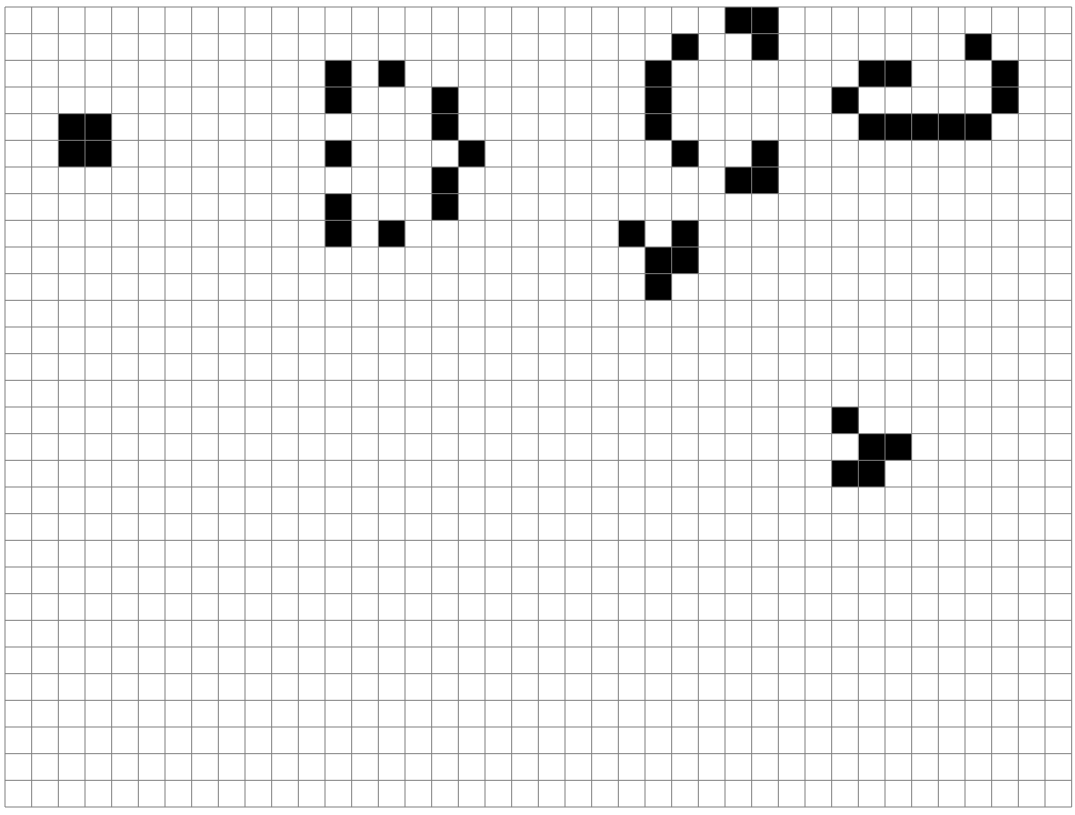


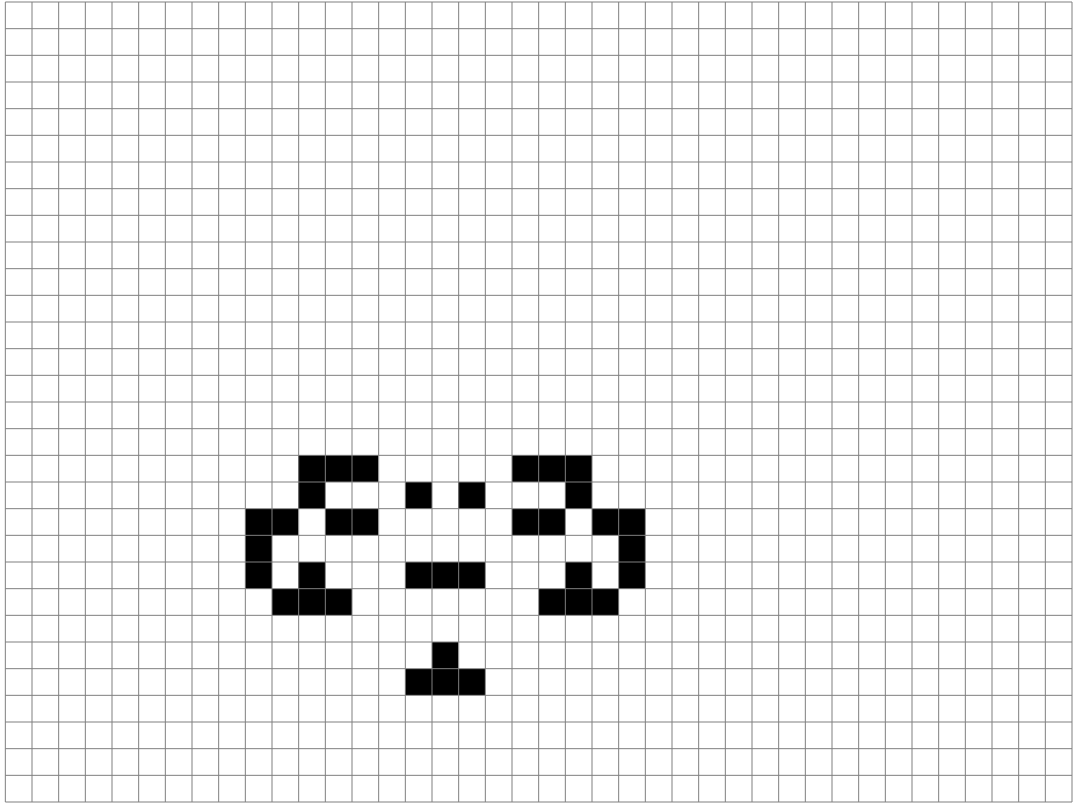
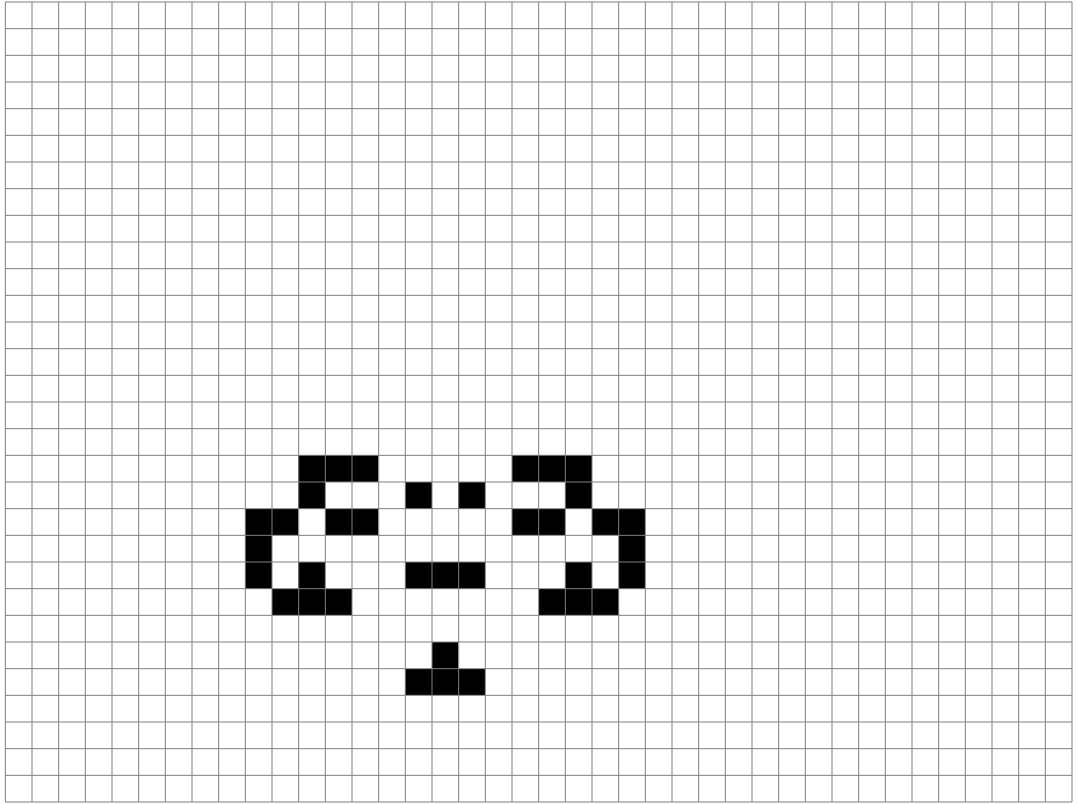


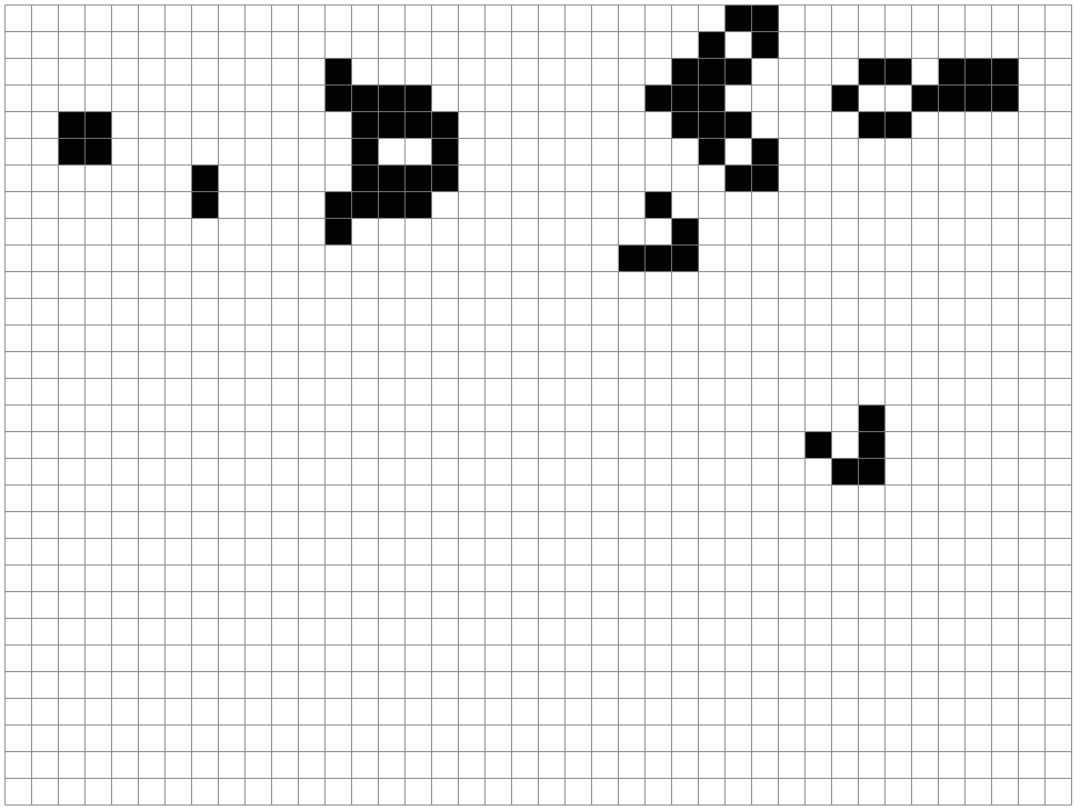
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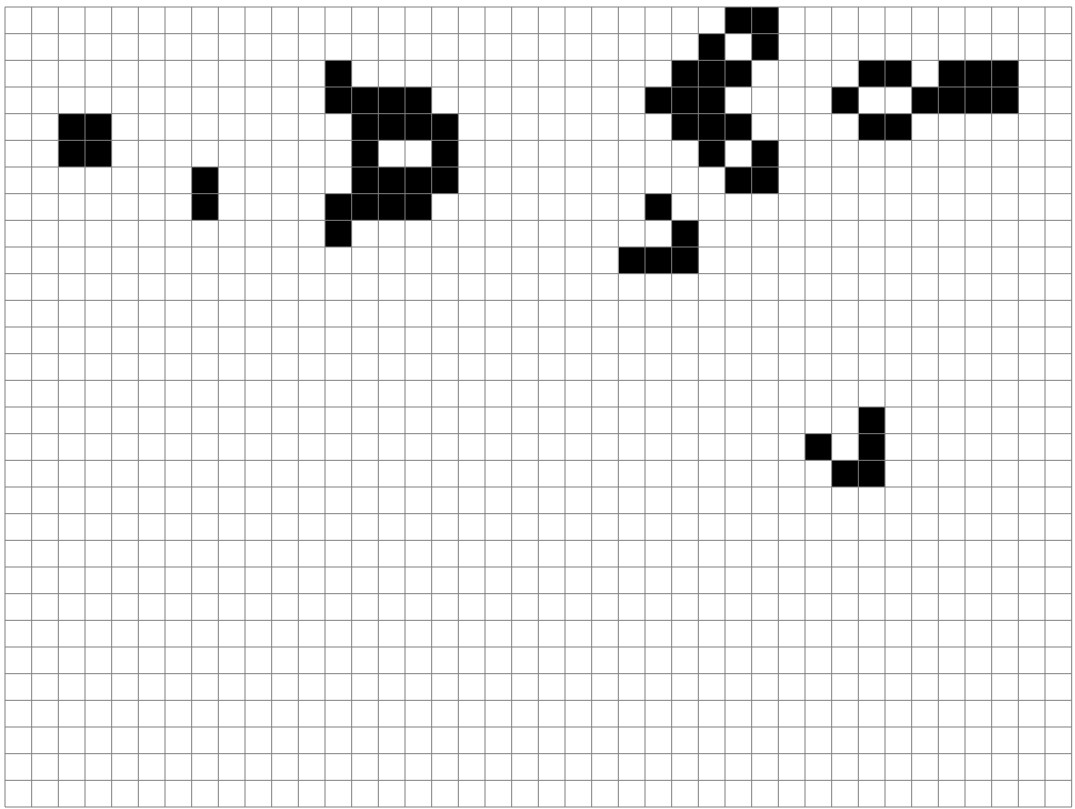
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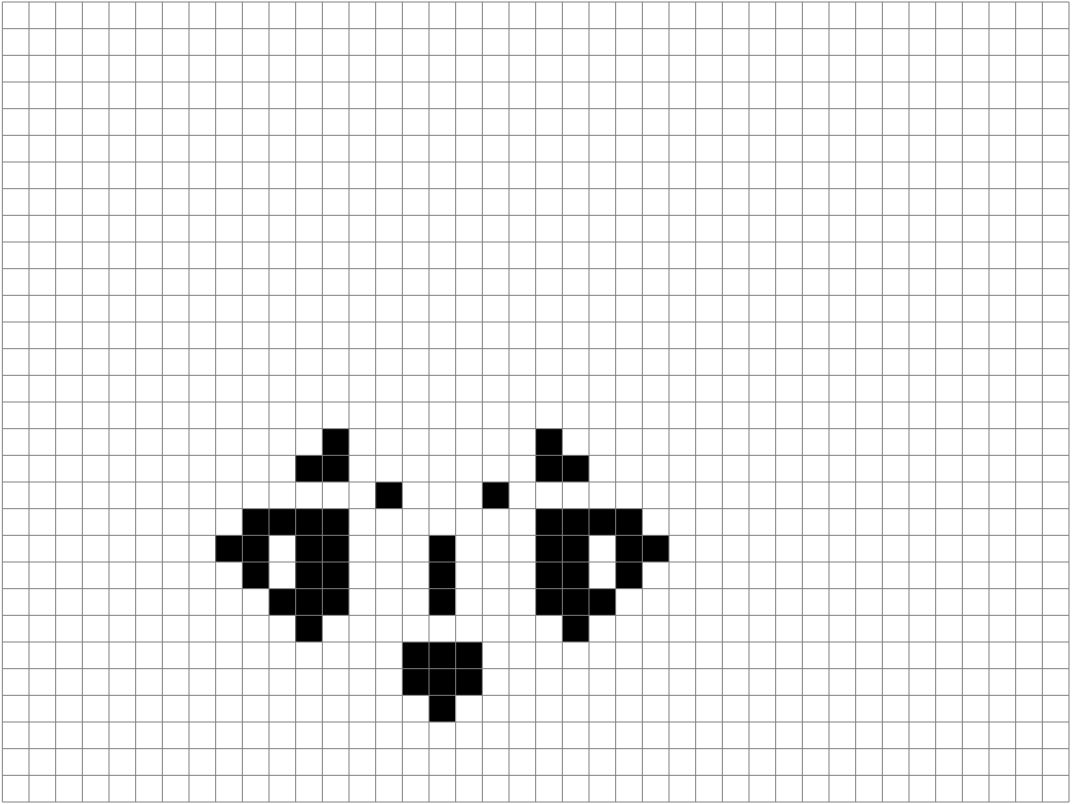
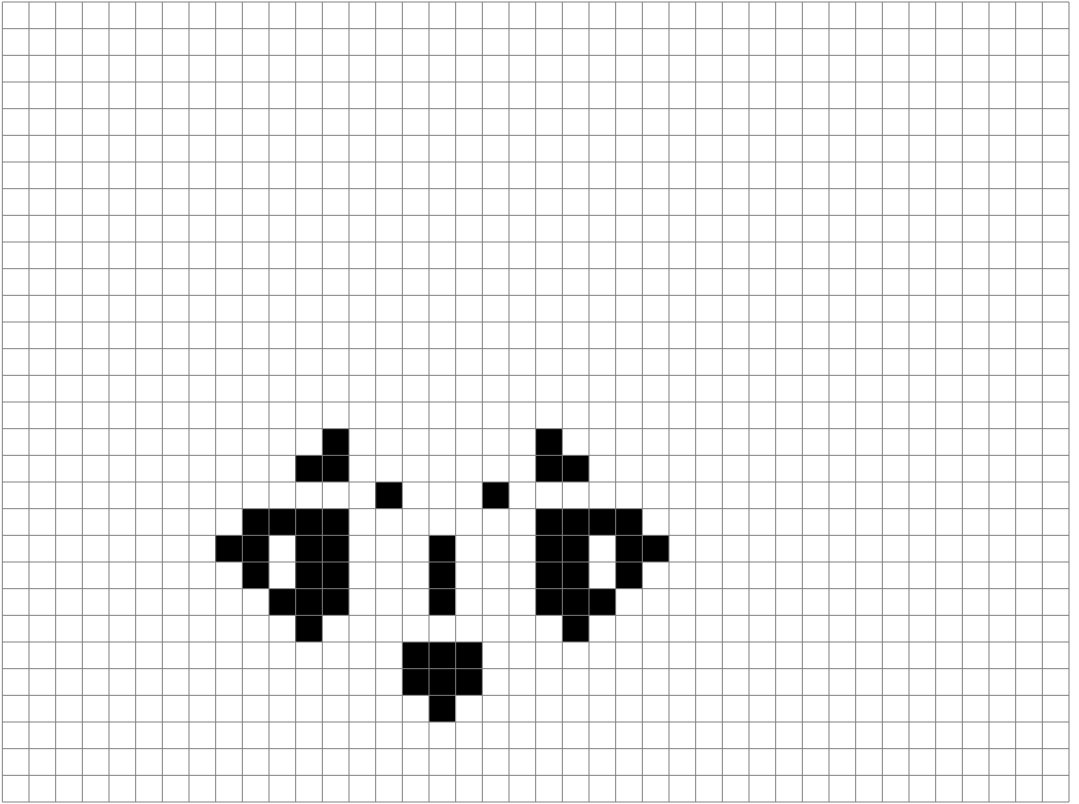




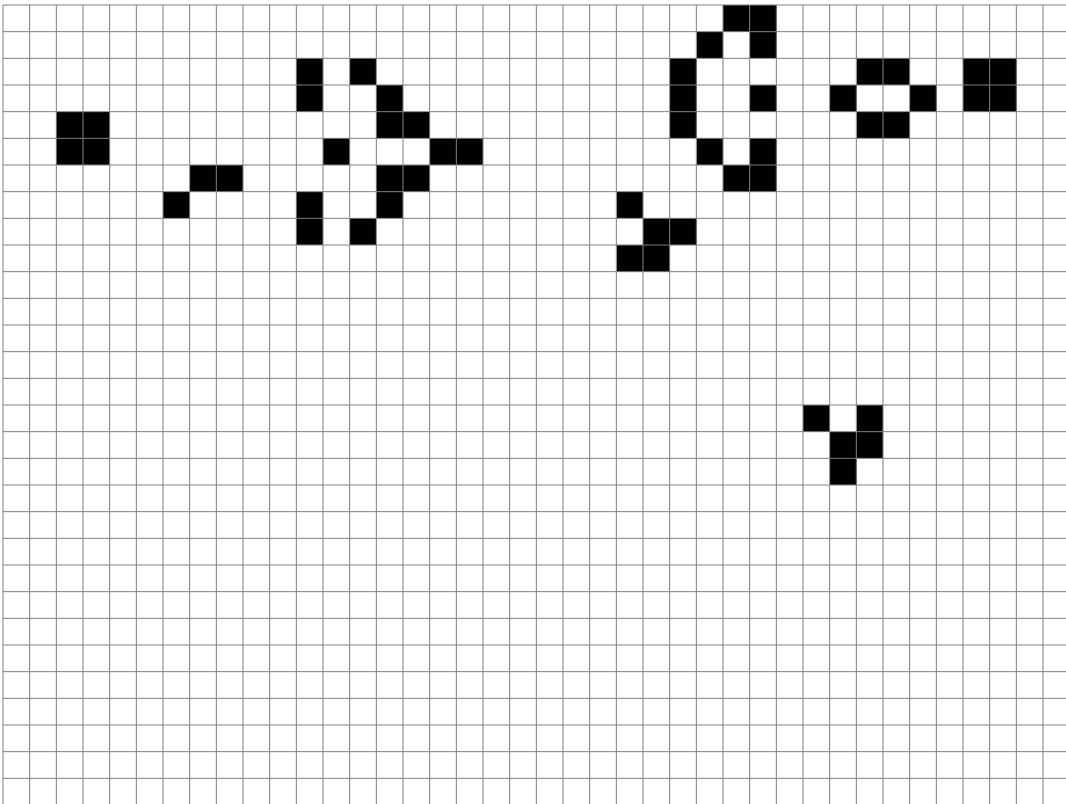
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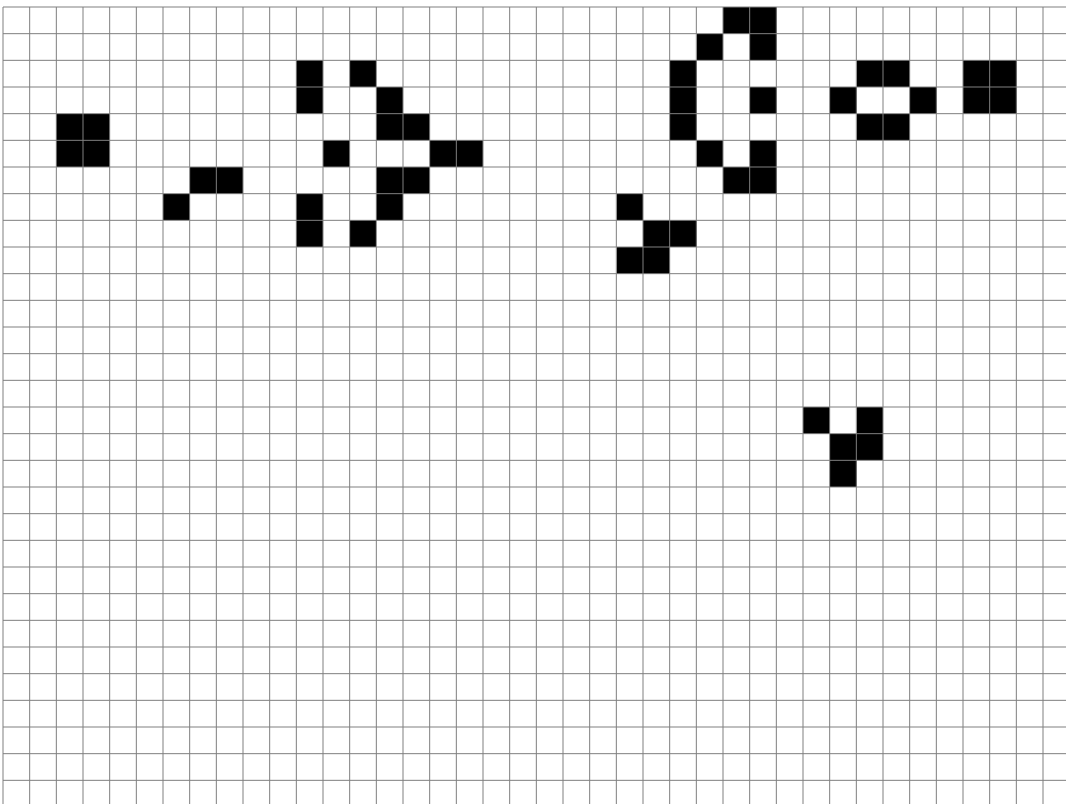
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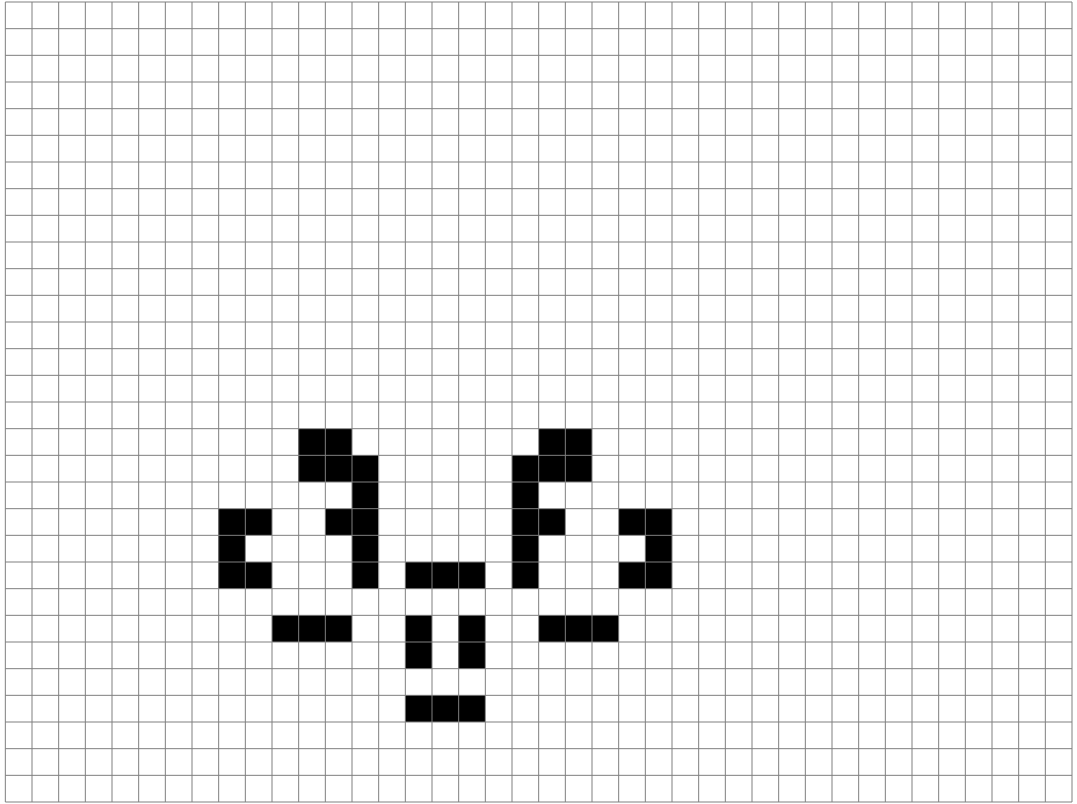
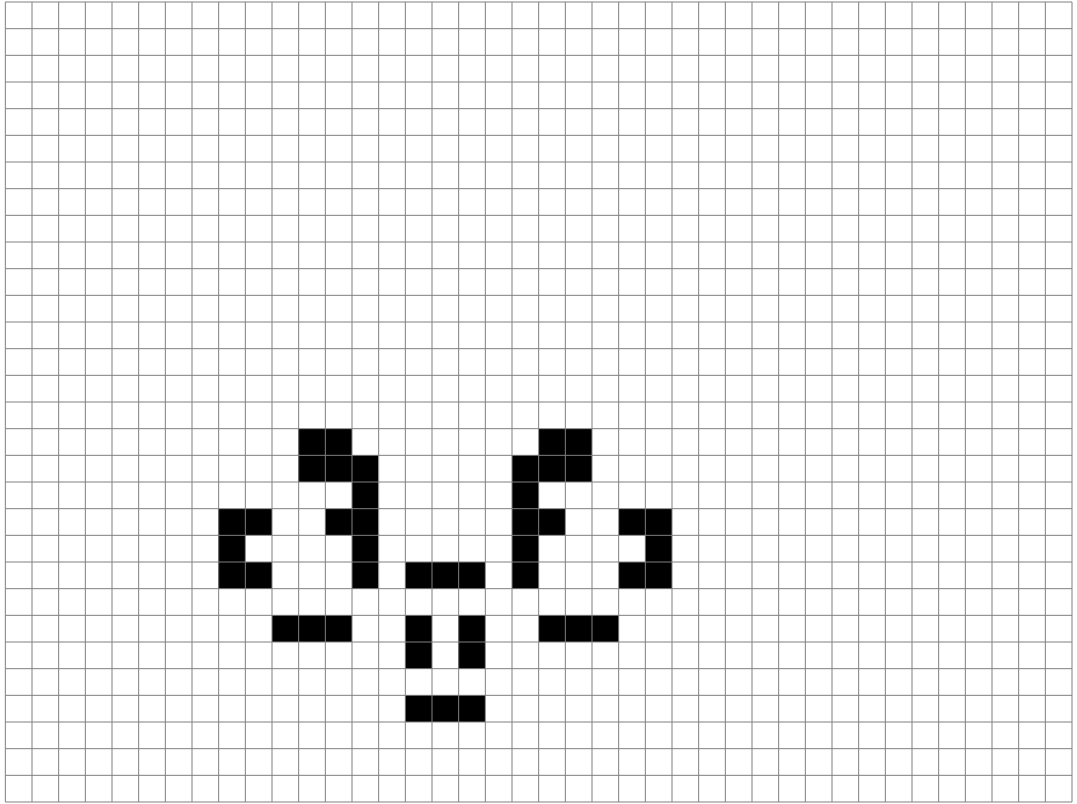


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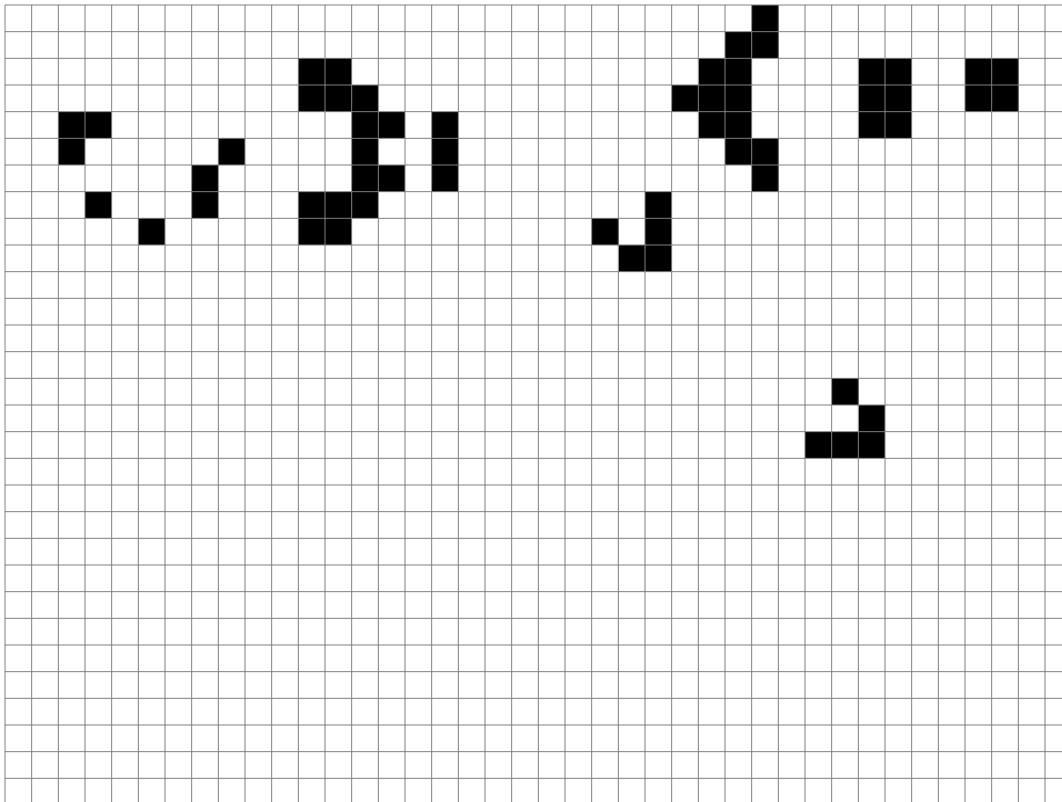


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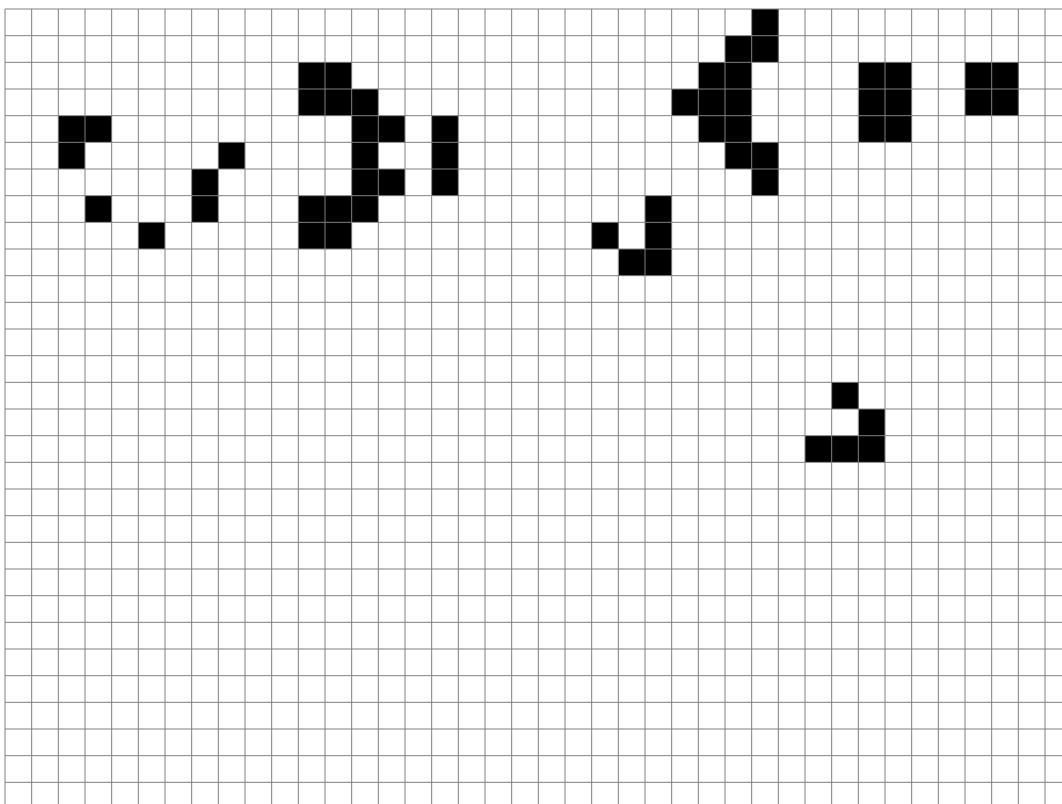


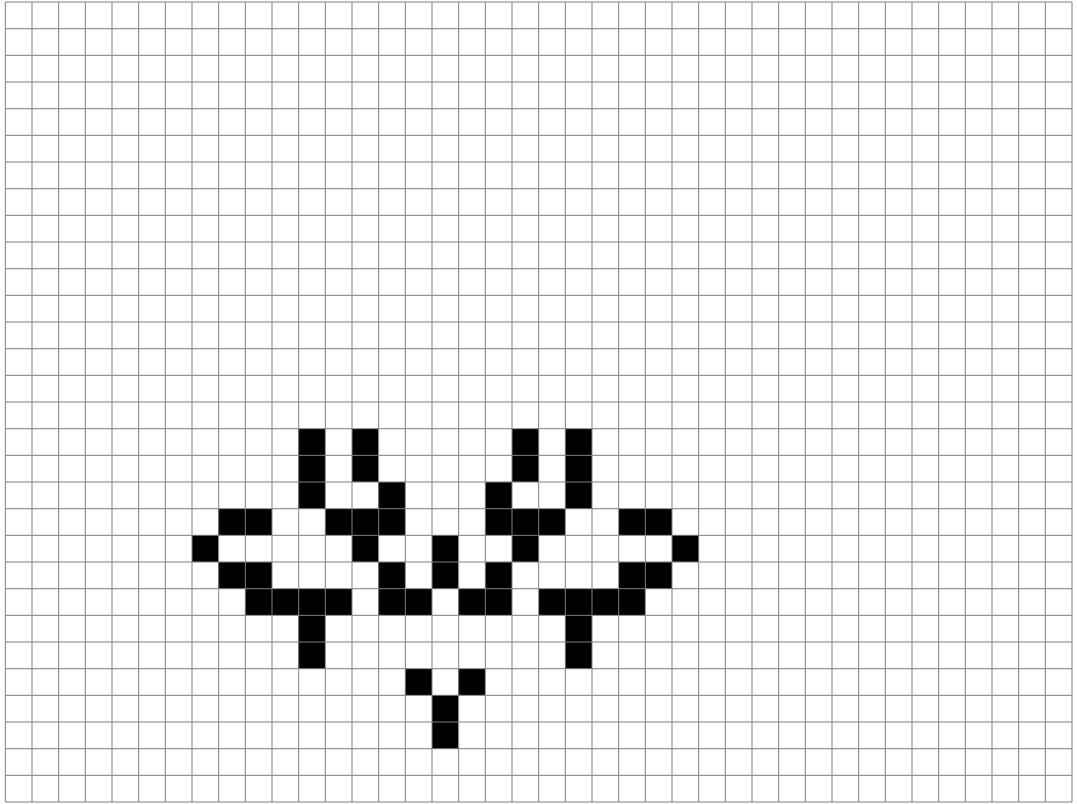
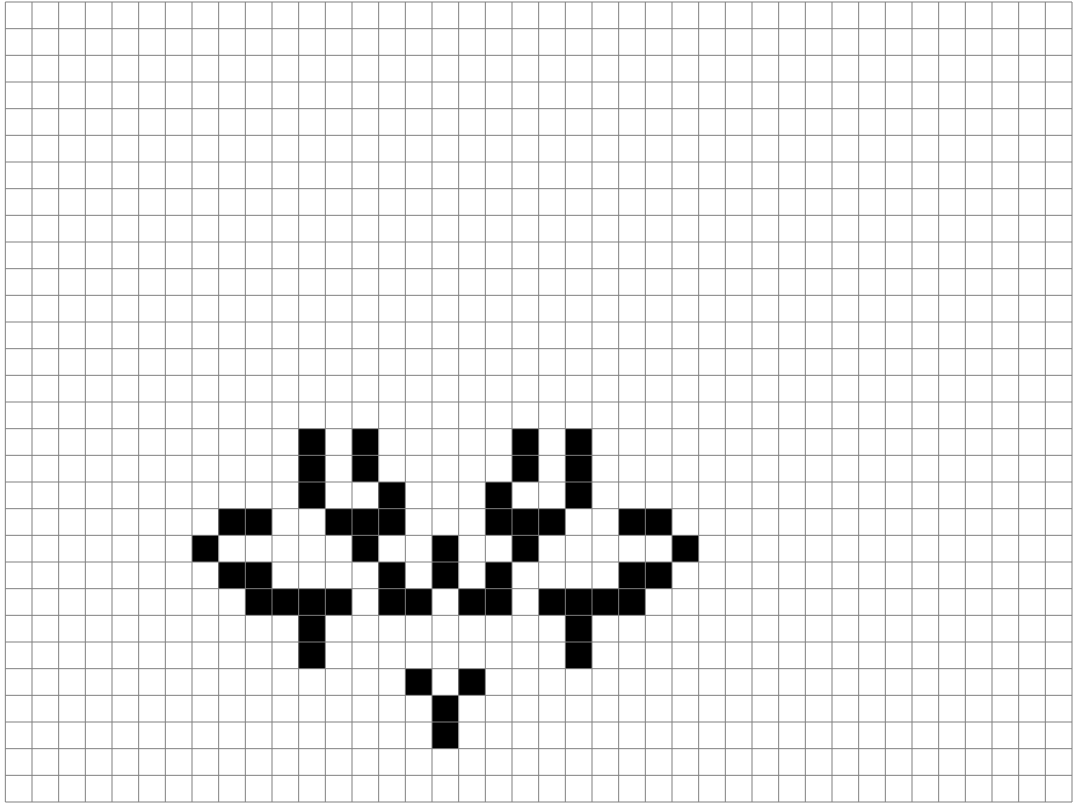


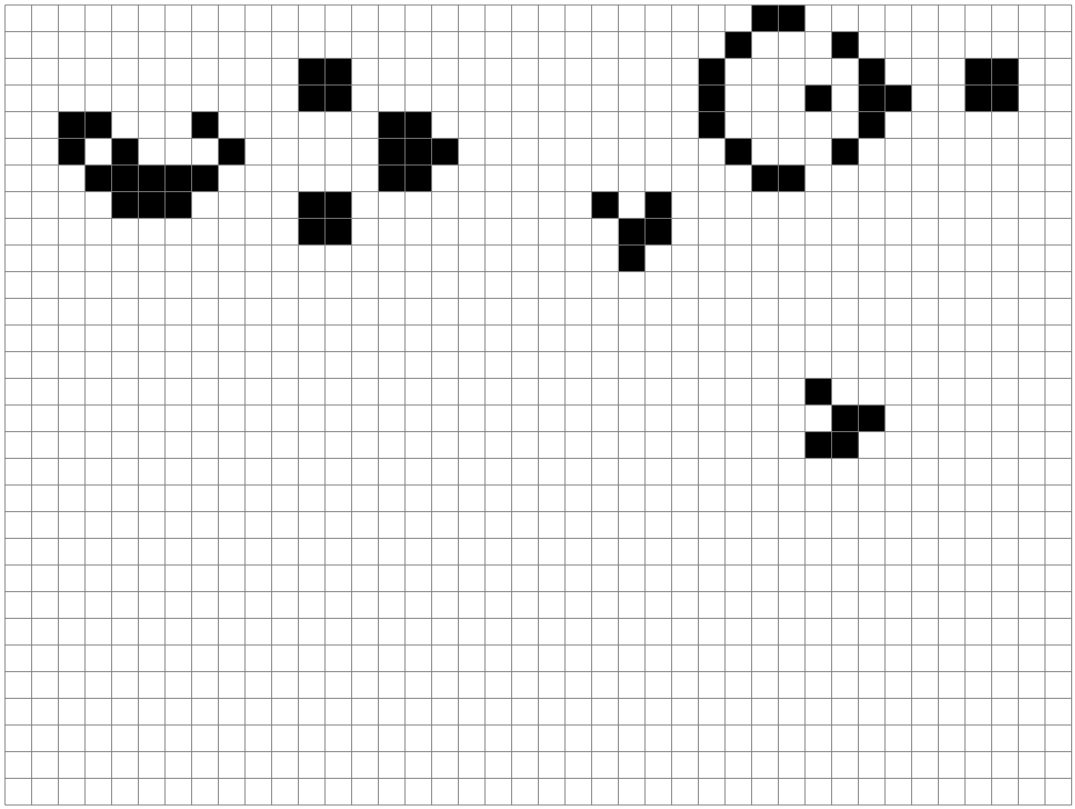
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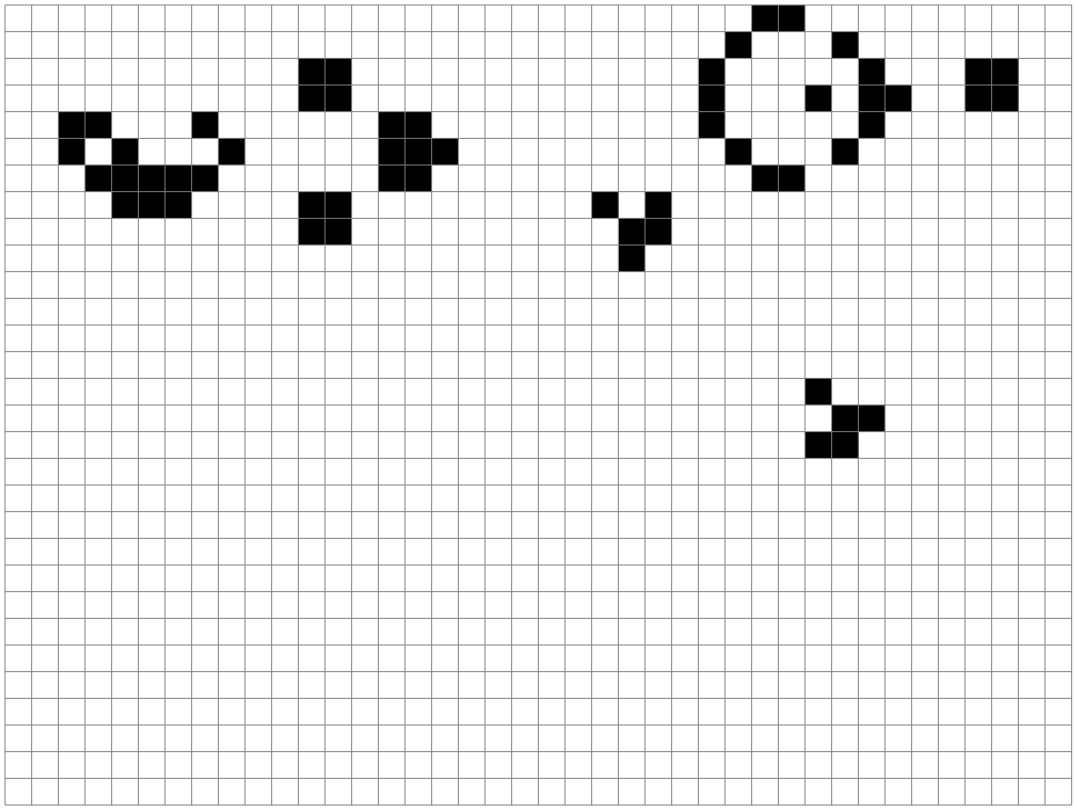
2







1



1



(Continued from other side)

The volume you hold in your hand bears only 49 generations each of two figures. This restriction is imposed by the maximum staple size on the printer I habitually use. Both sides flip back to front. The front-facing figure is the glider gun. The back-facing figure is called the "pi ship" and was discovered in 1997 by David Bell, one of my college roommates.

Because the life generations are computed strictly in PostScript, as they're printed, the geometrically-inclined will immediately note the entropy-violating discontinuity: Because the life rules can't be run backwards, the front-facing pages are all generated by first computing all the generations up to the one to be printed, so those 49 pages actually required $50+49+\dots+1$ or 1225 generations to be computed.

Programming completed 8 May 2006; narrative text completed onboard United Airlines flight 258 to Denver, 10 May.



(Continued from other side)

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