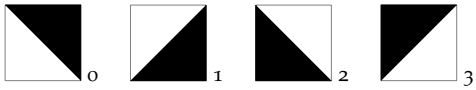
TRUCHET BOOK (I)

4X4 PATTERNS WITH ROTATIONAL SYMMETRY

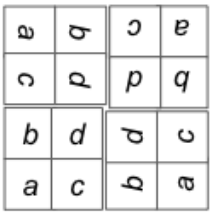
Current printing, January 2025

Introduction

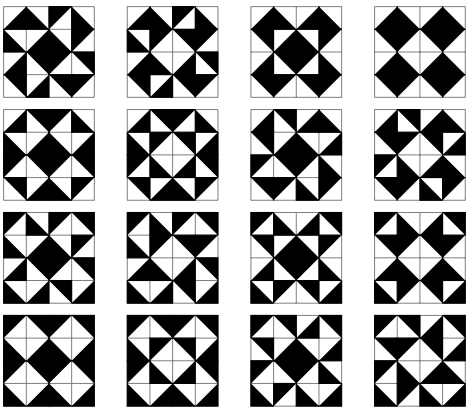
This booklet presents a complete listing of 4*x*4 Truchet tile patterns with rotational symmetry. Truchet tiles are, traditionally, square tiles that are divided by a diagonal line, and coloured with two colours, one on either side of the diagonal. Each tile can be rotated to one of four positions.



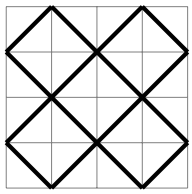
Each 4*x*4 Truchet tile pattern with rotational symmetry has a core 2*x*2 pattern in one of its quadrants that is rotated to produce the overall pattern. In this booklet, the core pattern is assumed to be in the lower left. Each pattern can identified as a sequence of 4 digits *abcd* that list the rotational positions of each tile in the lower left quadrant.



We can group these tile patterns into families where Truchet tile patterns are considered to be in the same family if they would look the same without colour – if each corresponding tile shares the same diagonal direction. The sequence that represents the family of a tile pattern can be found by taking the sequence of the tile pattern *modulo* 2. So, for example, the 16 tile patterns below are all members of the 0110 family.

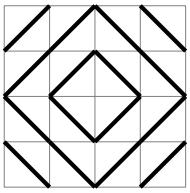


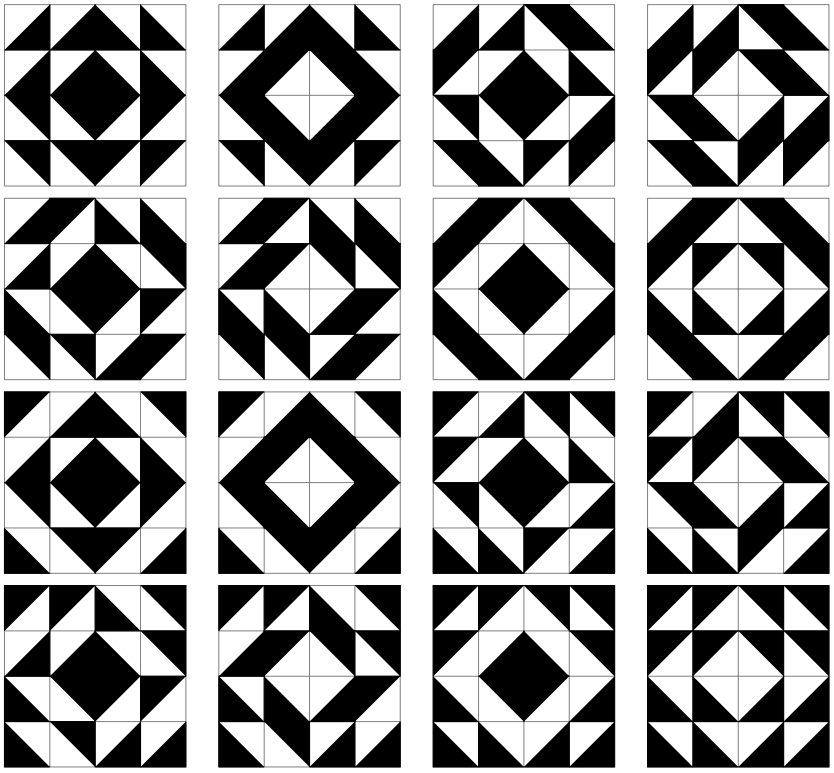
The 0110 pattern family



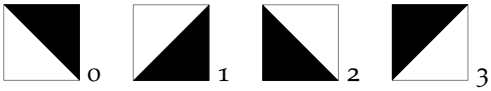
The 0110 family pattern

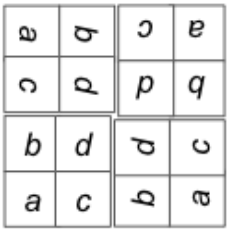
0000





0000 0002 0020 0022
0200 0202 0220 0222
2000 2002 2020 2022
2200 2202 2220 2222





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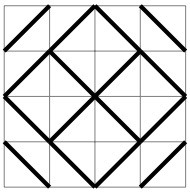

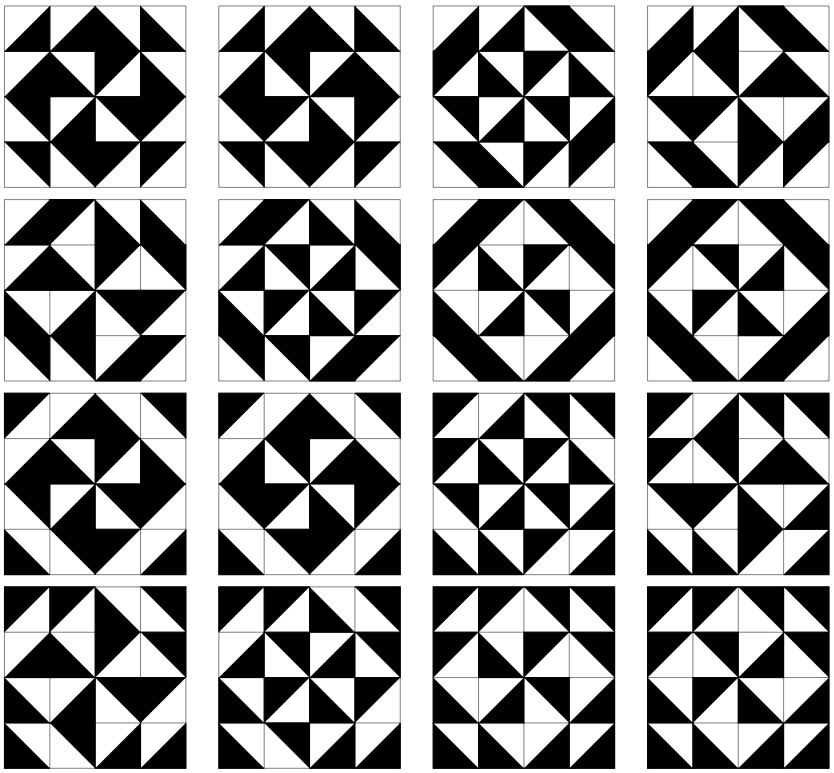

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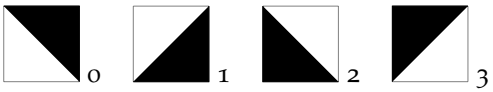
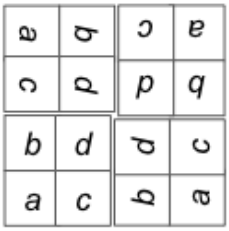
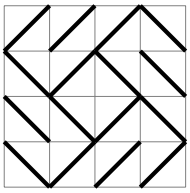
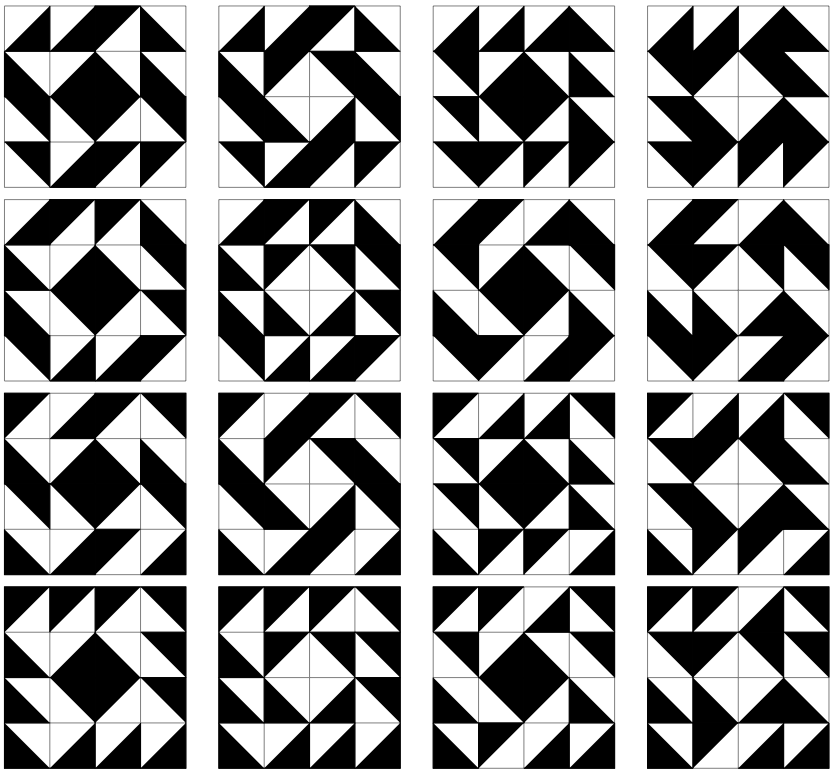
0201 0203 0221 0223
2001 2003 2021 2023
2201 2203 2221 2223





0010





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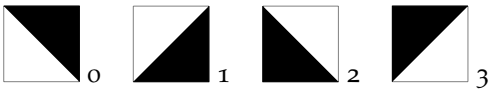
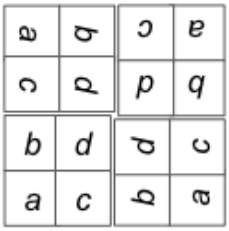
2010 2012 2030 2032
2210 2212 2230 2232





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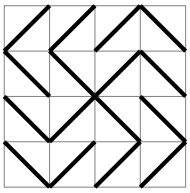

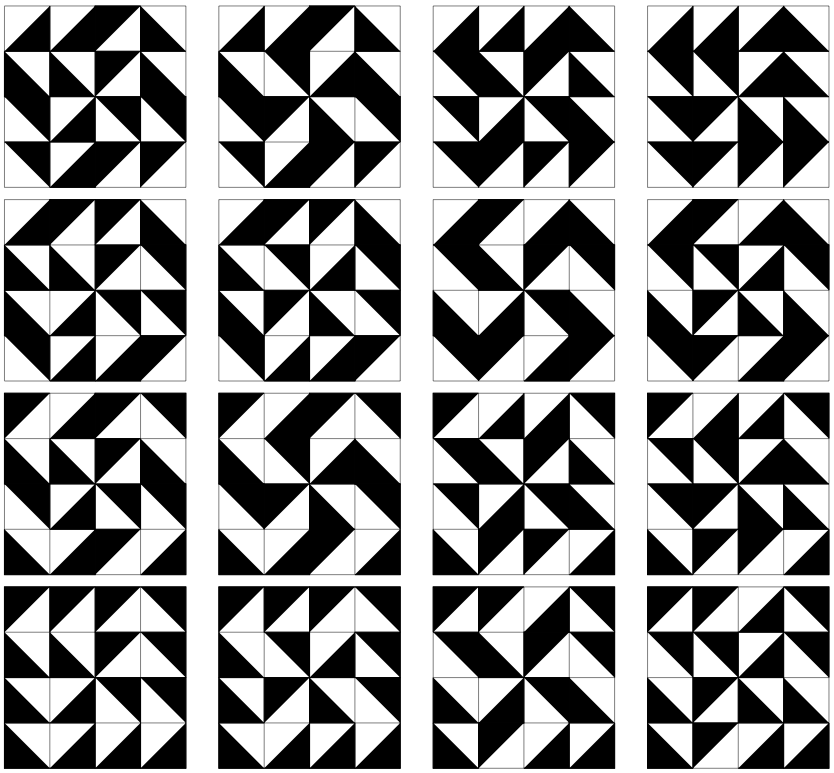

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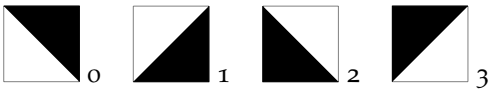

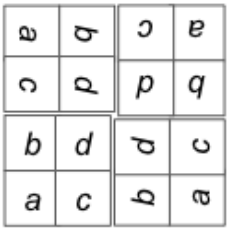

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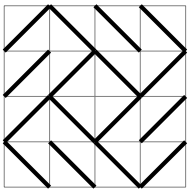

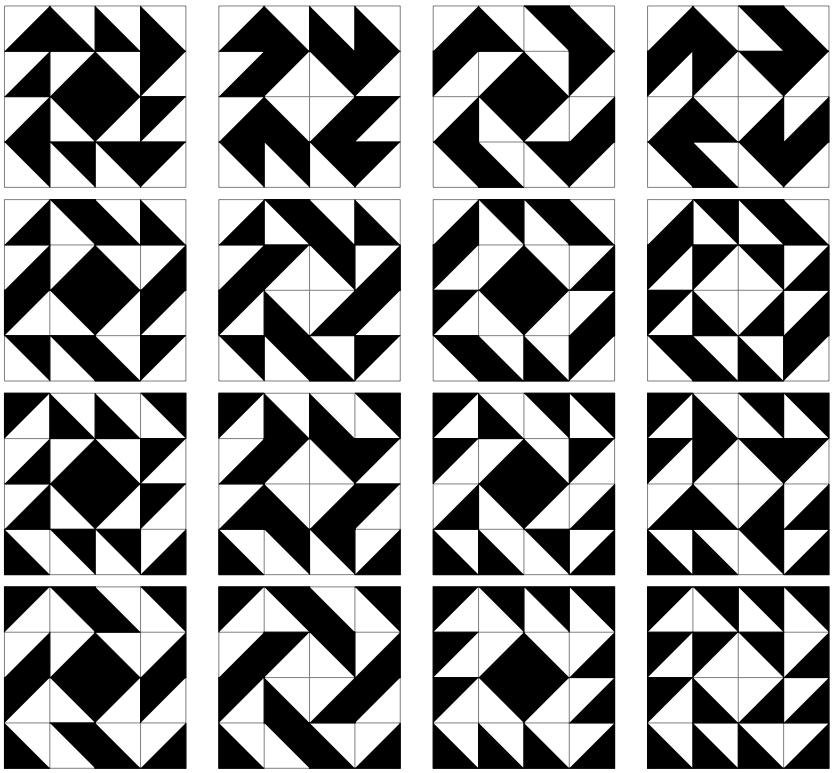

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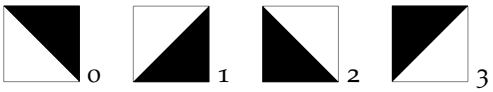

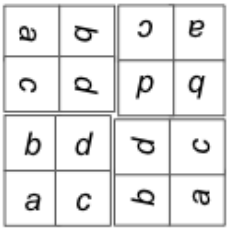

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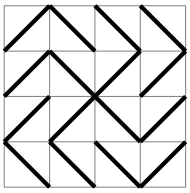

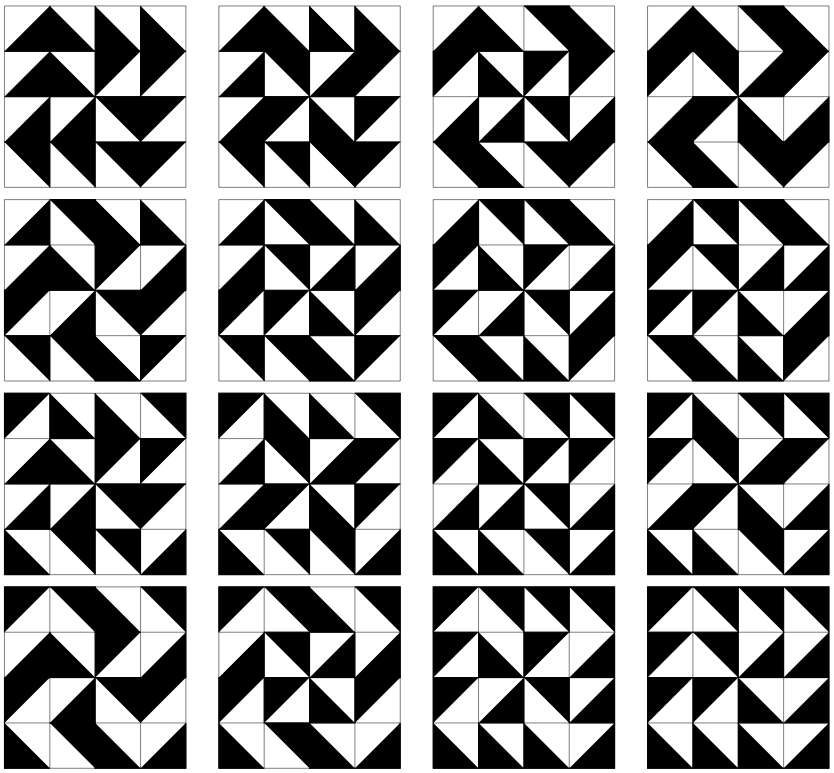

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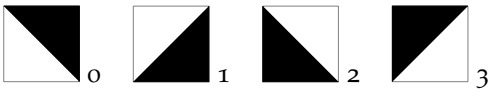

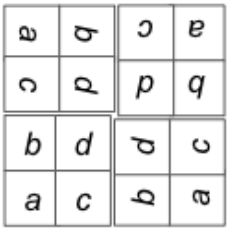

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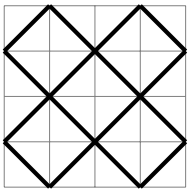

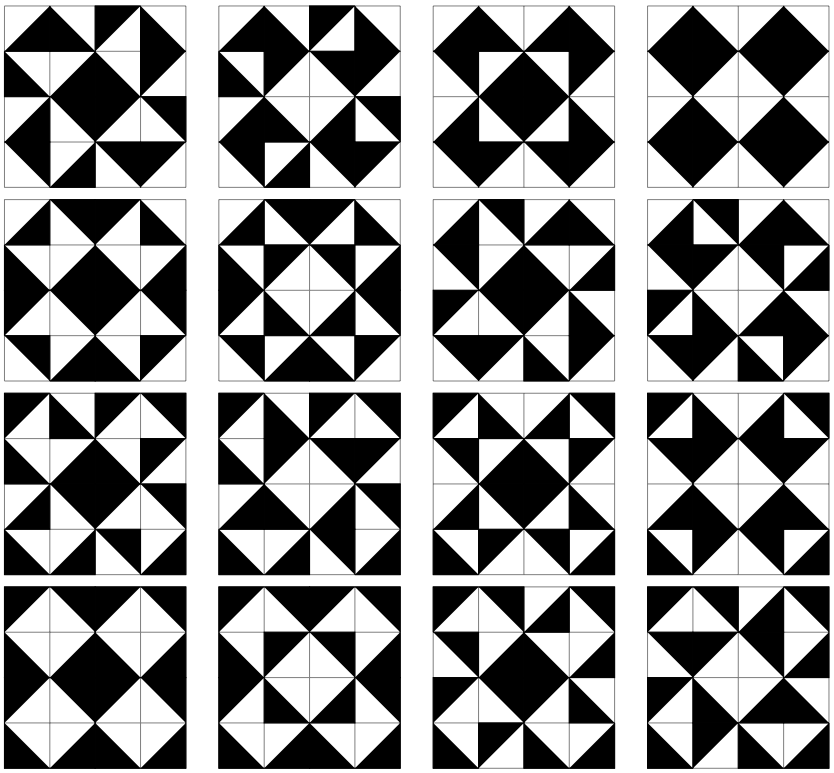

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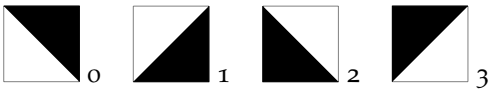

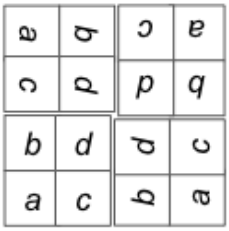

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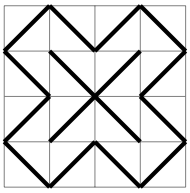

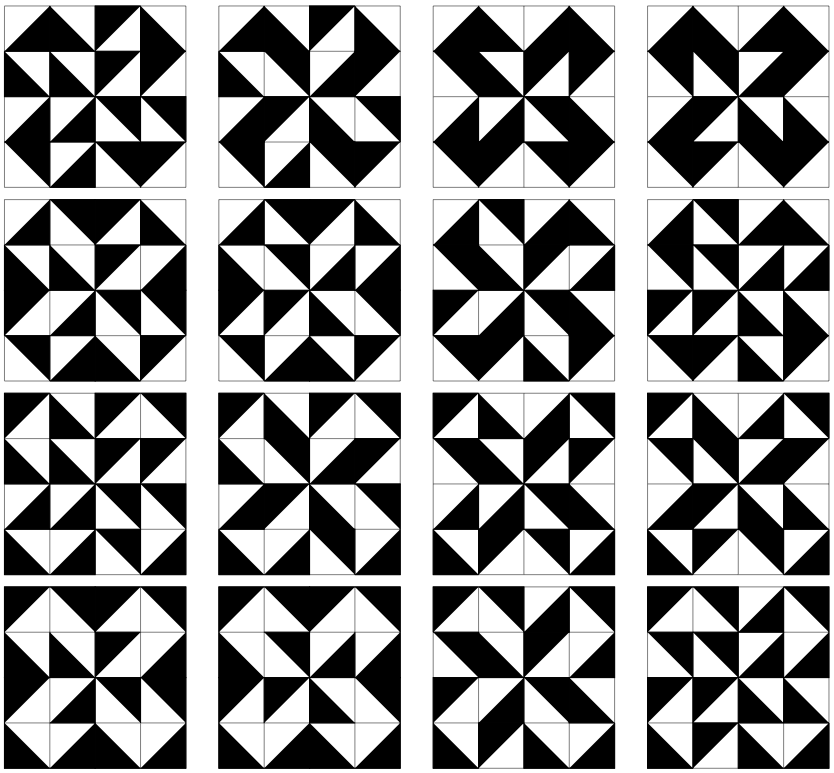

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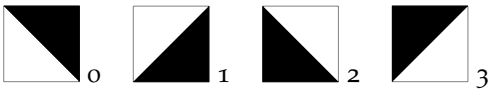

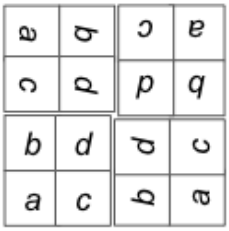

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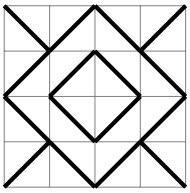

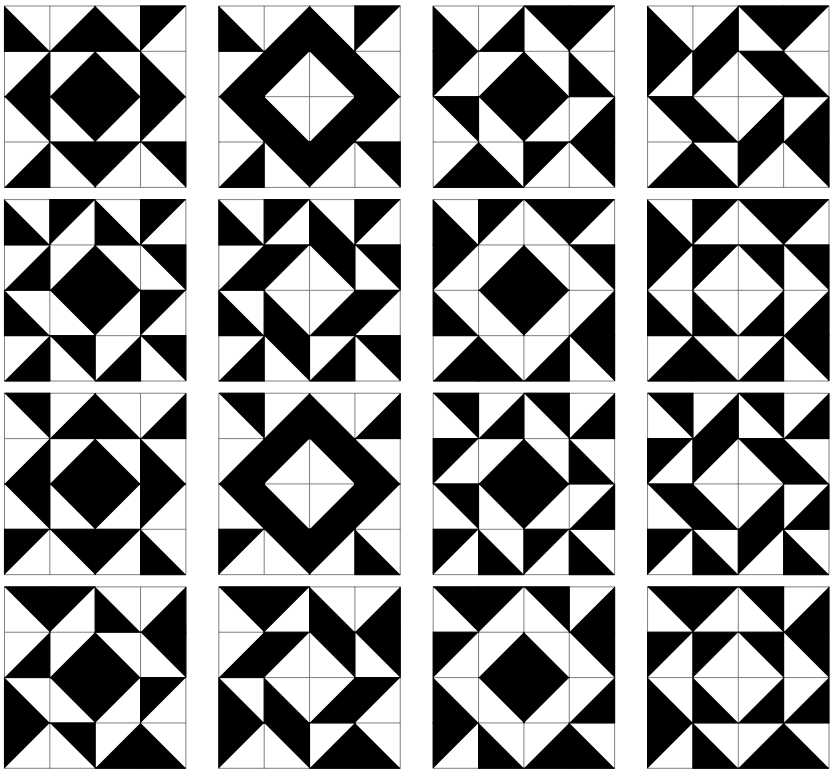

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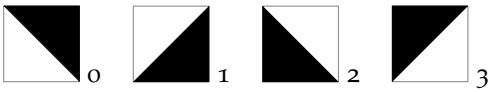

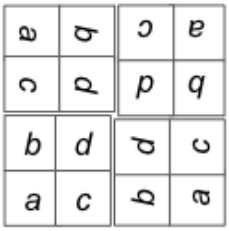

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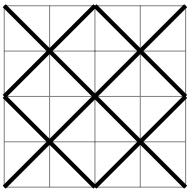

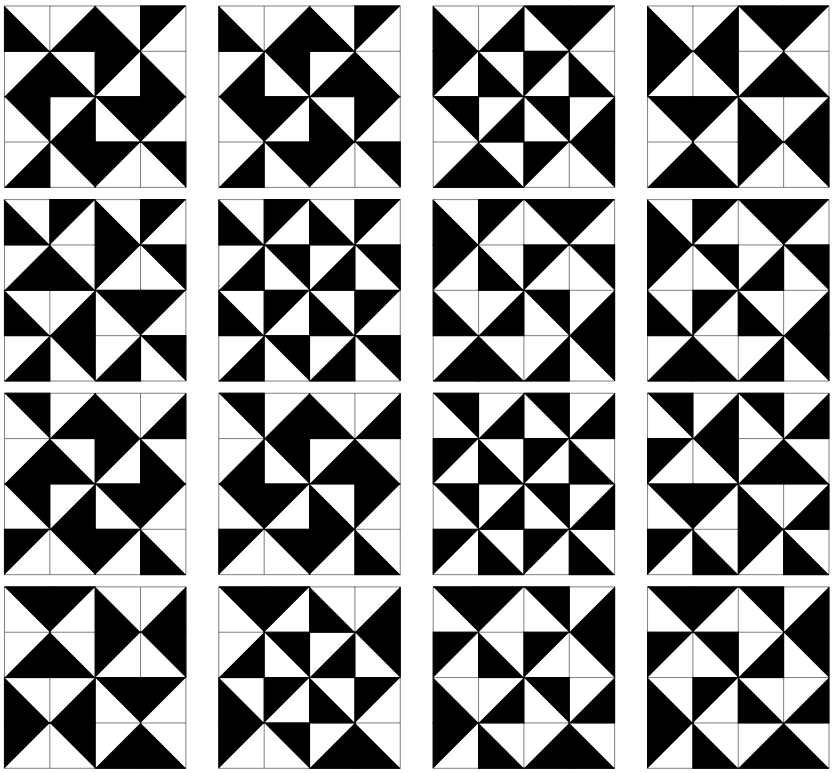

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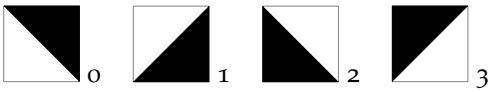
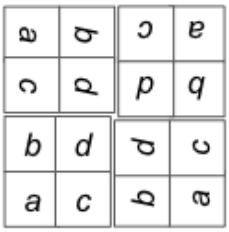
1201 1203 1221 1223
3001 3003 3021 3023
3201 3203 3221 3223





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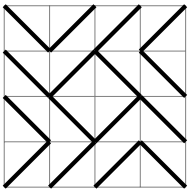

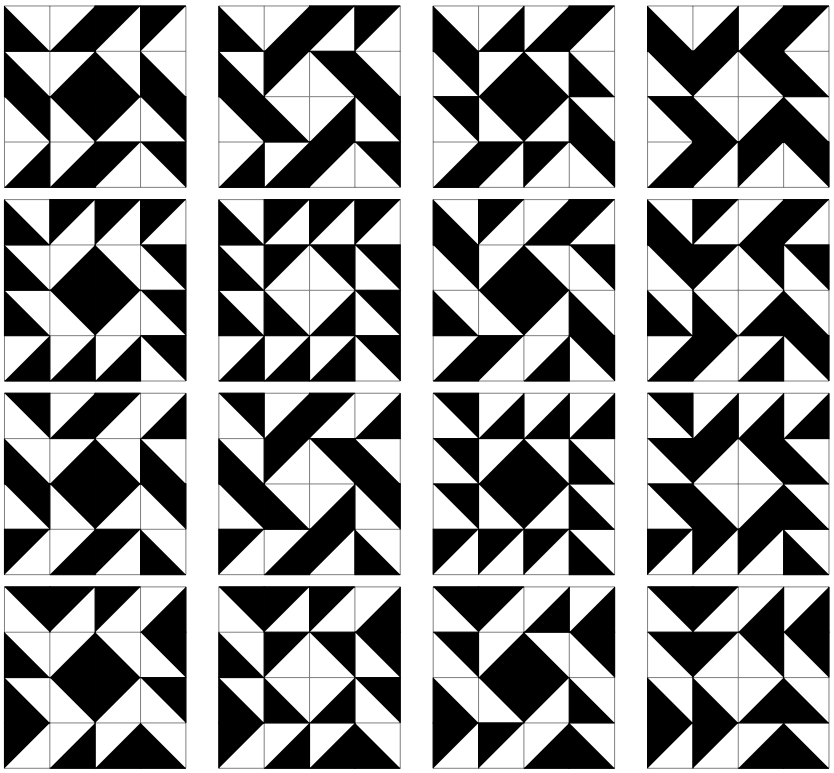

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1210 1212 1230 1232
3010 3012 3030 3032
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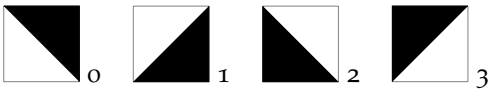

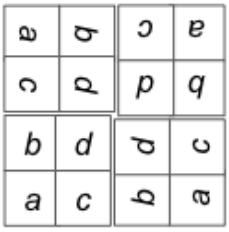

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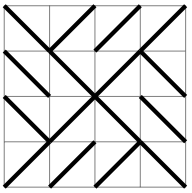

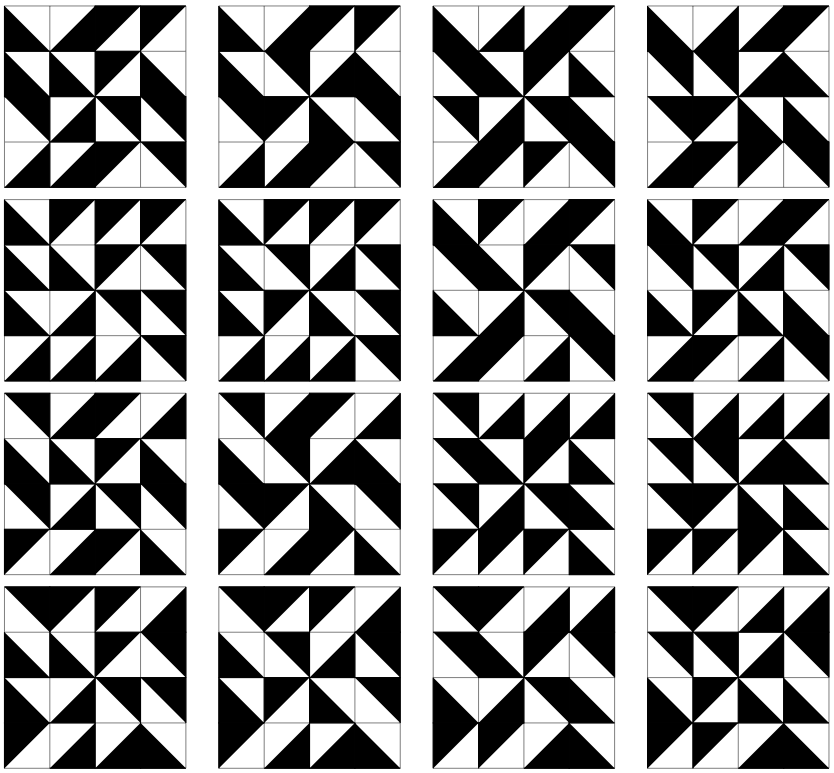

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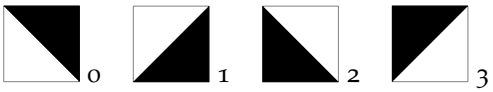

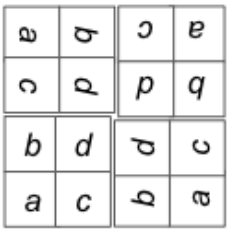

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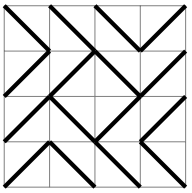

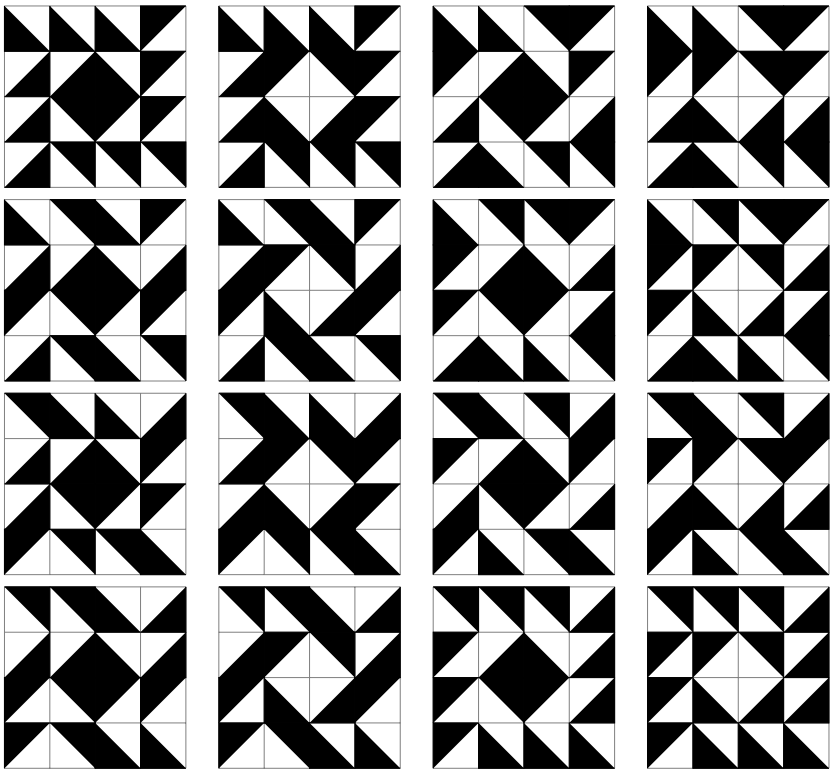

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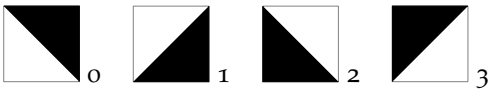

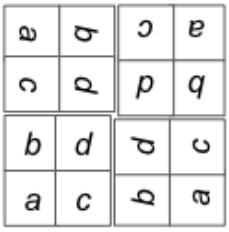

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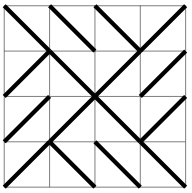

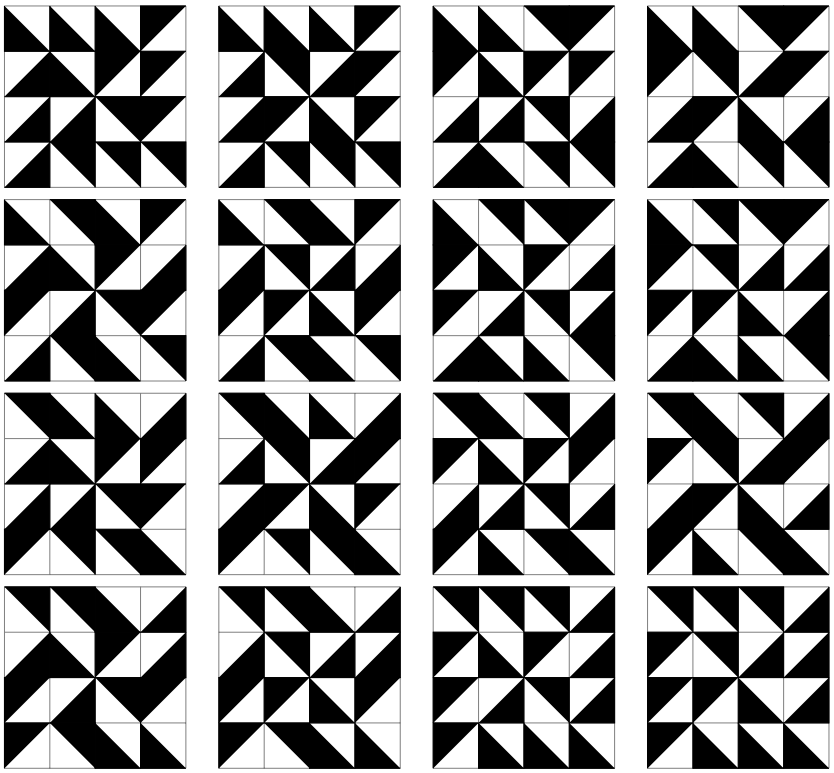

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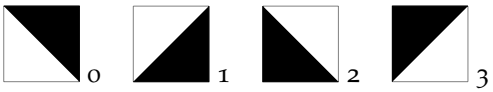

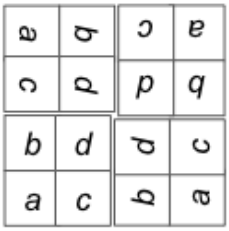

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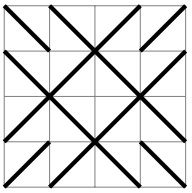

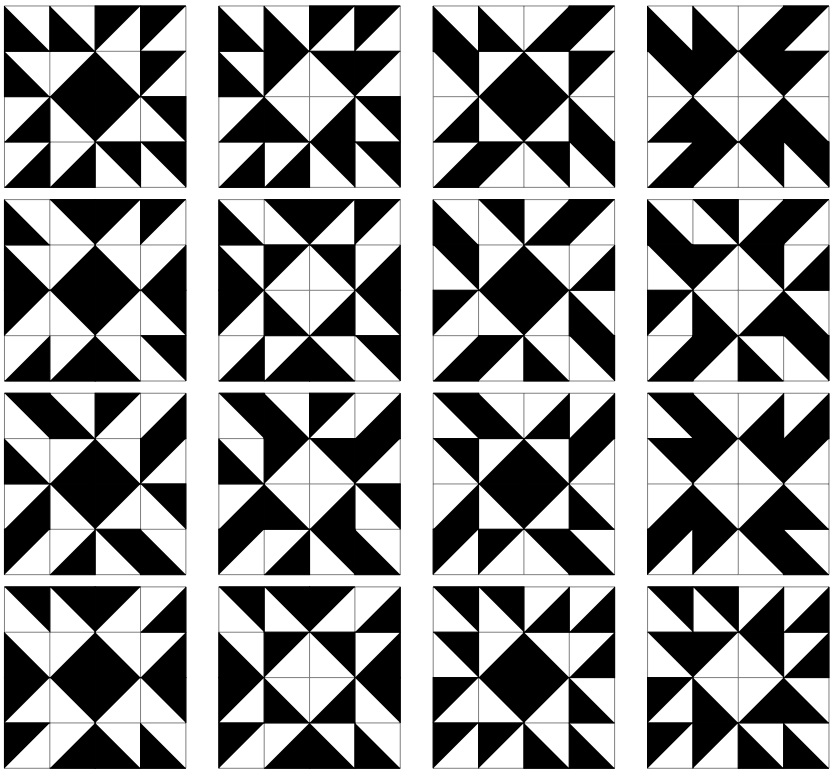

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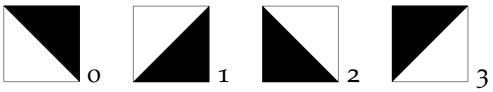

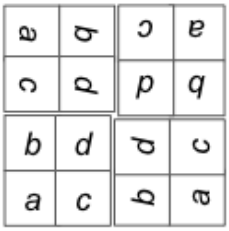

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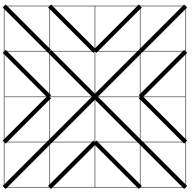

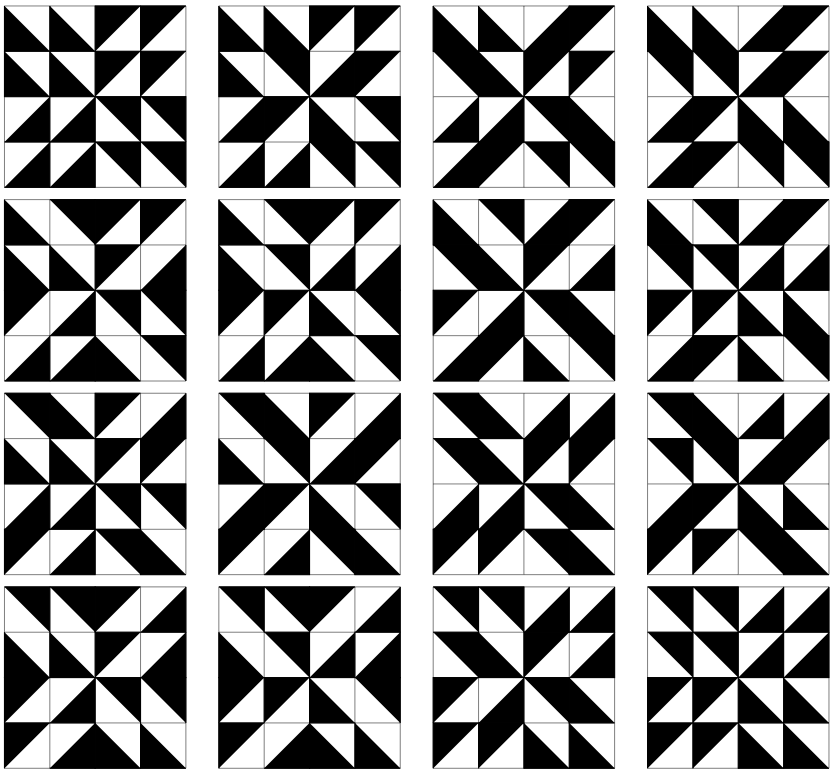

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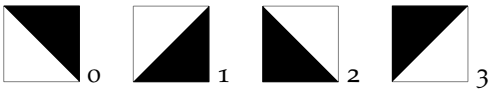

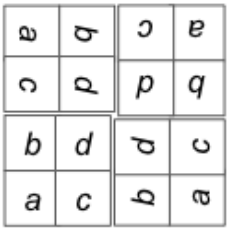

Bibliography

J. Truchet and S. Truchet. *Methode pour faire une infinité de desseins differens, avec des carreaux mi-partis de deux couleurs par une ligne diagonale : ou Observations du Pere Dominique Douat... sur un Memoire inseré dans l'Histoire de l'Academie Royale des Sciences de Paris l'année 1704 présenté par... Sebastien Truchet...* Chez Florentin de Laulne, 1722. URL https://books.google.ca/books?id=pK7-X6u7FCMC.