

# List of tree diagrams implementing the $d = 11$ neutrino mass operator $LLHH(HH^*)^3$

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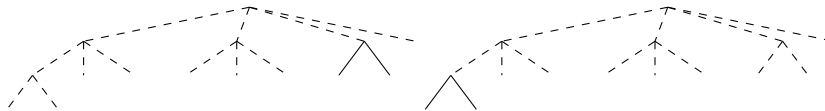
J.C. Helo¶  
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In the paper “*High-dimensional neutrino masses*” (arXiv:180A.AAAAA [hep-ph]) we considered all possible tree-level realizations of the neutrino mass operators  $LLHH(HH^*)^{(d-5)/2}$  with  $d = 9, 11, 13$ . For  $d = 11$ , there are 504 diagrams organized in 92 different topologies, which are listed here.

## Topology 1



## Topology 2



## Topology 3



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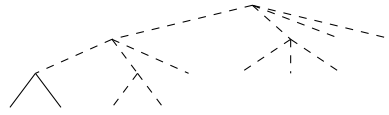
†Electronic address: [mahirsch@ific.uv.es](mailto:mahirsch@ific.uv.es)

‡Electronic address: [o.castillo.felisola@gmail.com](mailto:o.castillo.felisola@gmail.com)

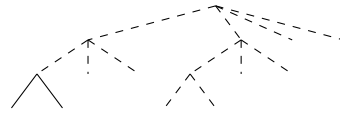
§Electronic address: [fonseca@ipnp.mff.cuni.cz](mailto:fonseca@ipnp.mff.cuni.cz)

¶Electronic address: [jchelo@userena.cl](mailto:jchelo@userena.cl)

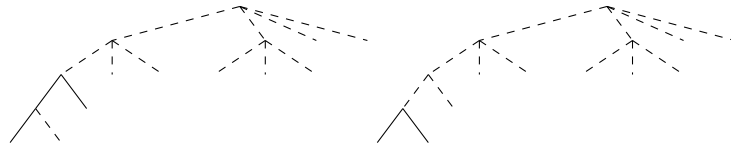
**Topology 4**



**Topology 5**



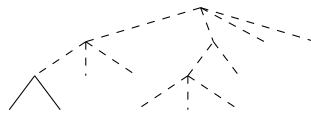
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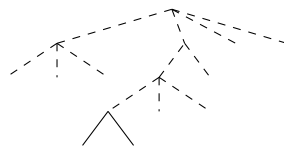
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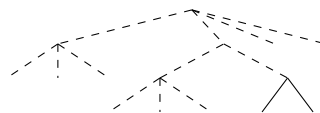
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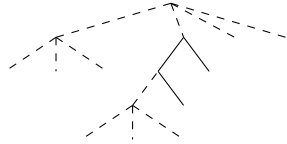
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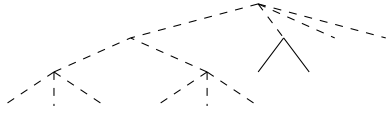
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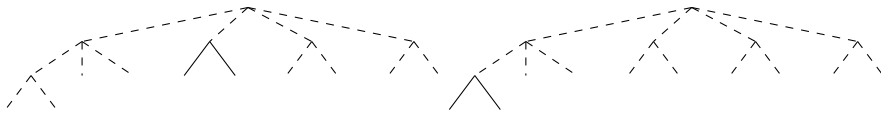
**Topology 11**



**Topology 12**



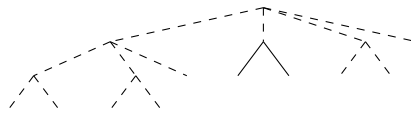
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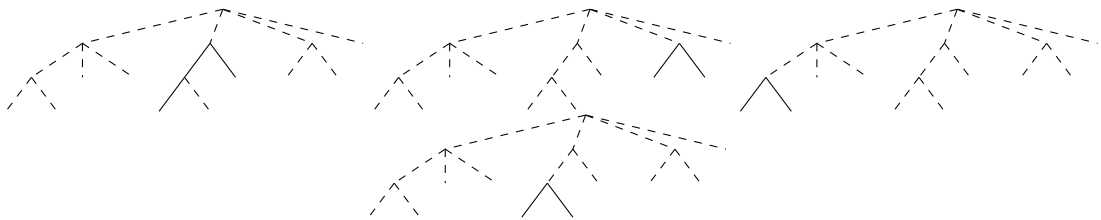
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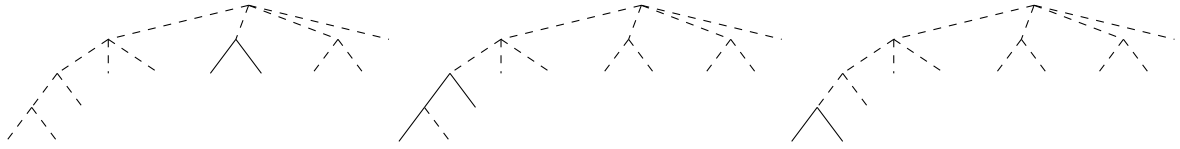
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**Topology 16**



**Topology 17**



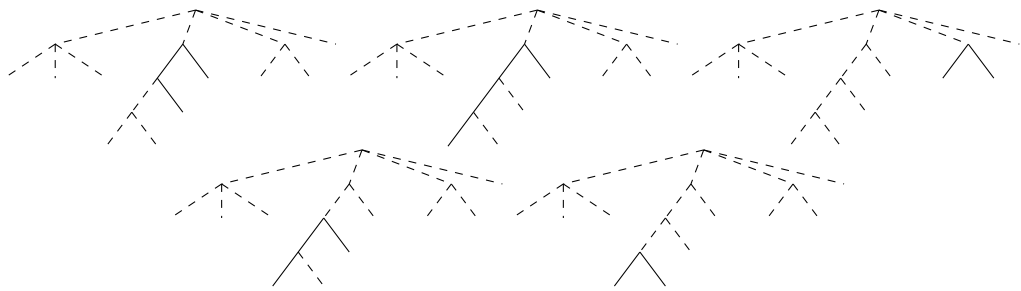
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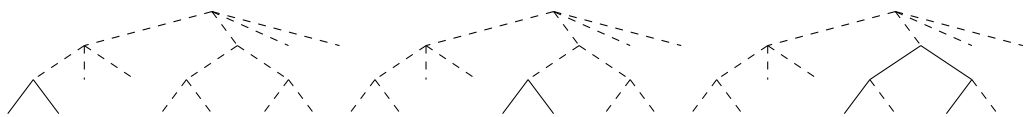
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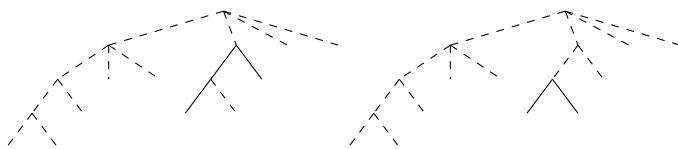
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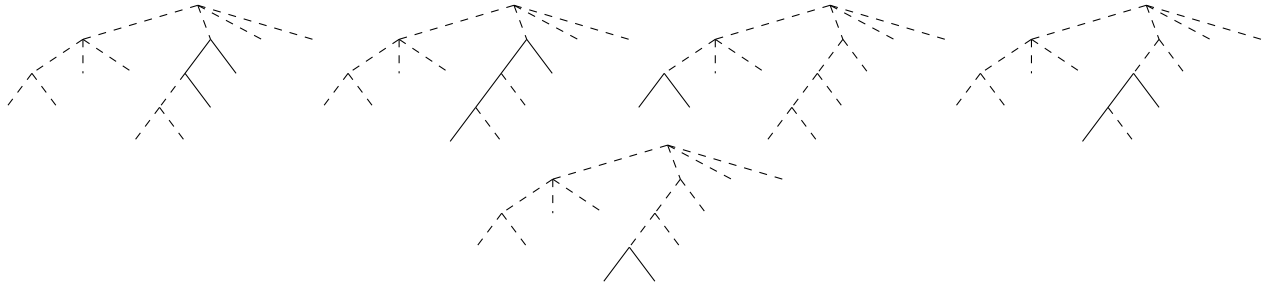
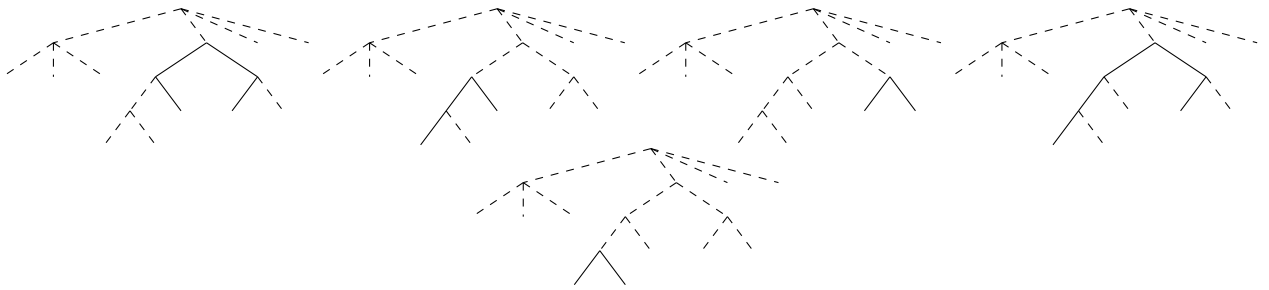
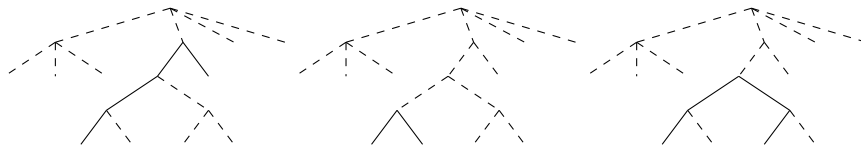
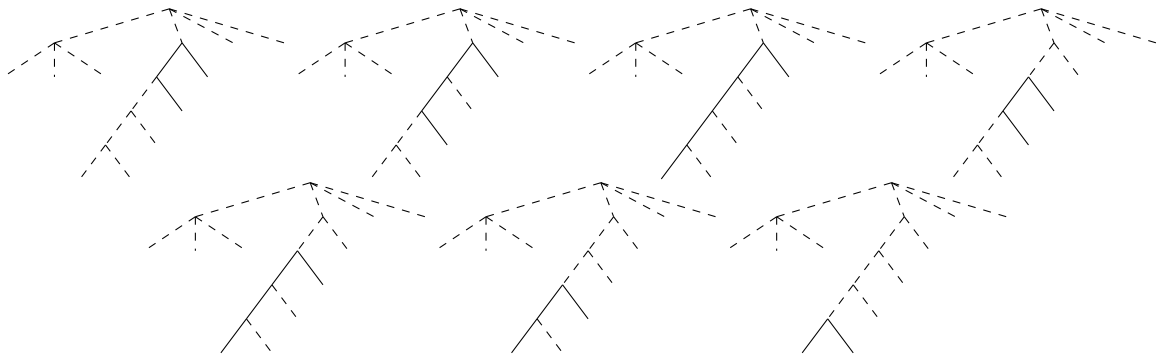


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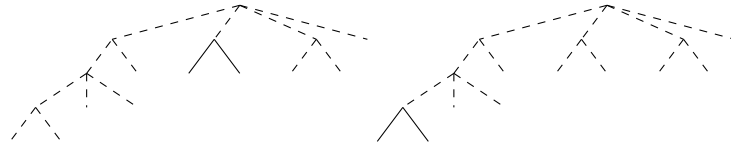


**Topology 22**



**Topology 23****Topology 24****Topology 25****Topology 26****Topology 27**

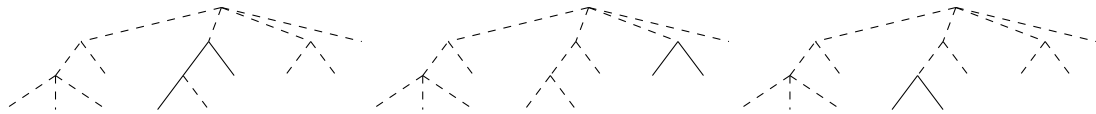
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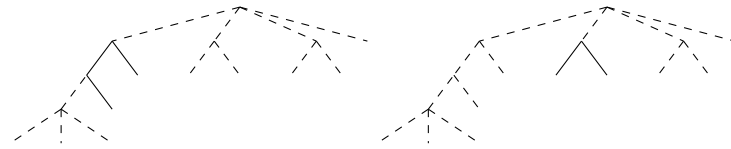
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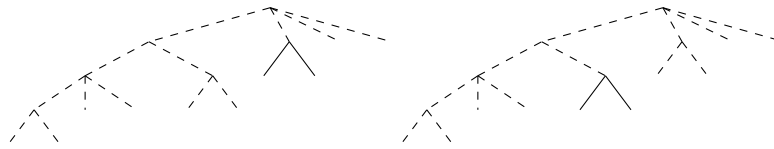
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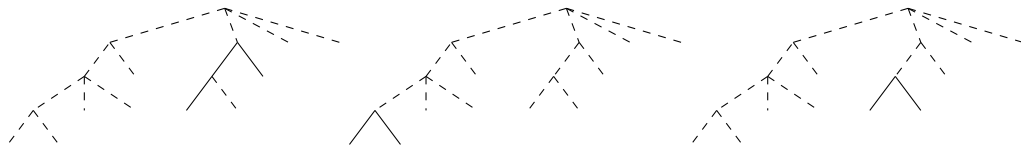
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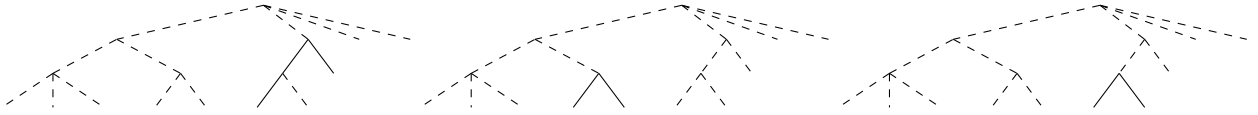
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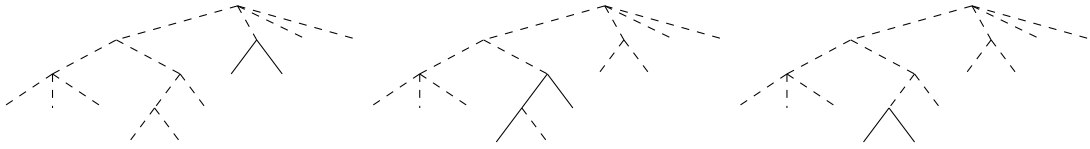
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**Topology 34**



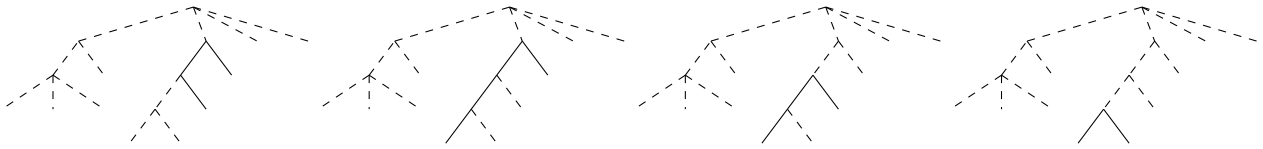
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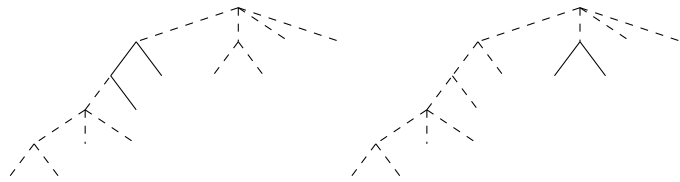
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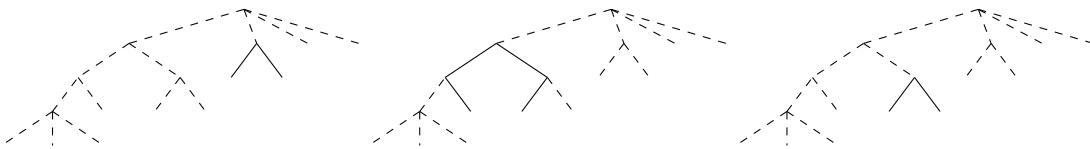
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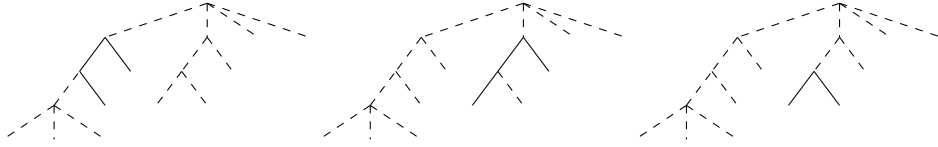
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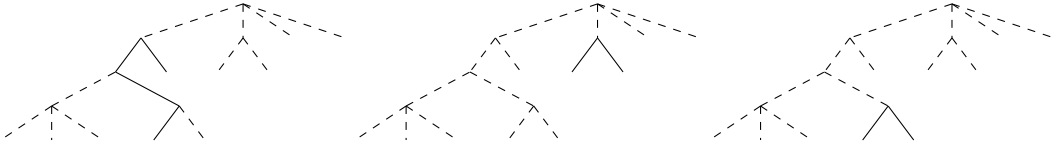
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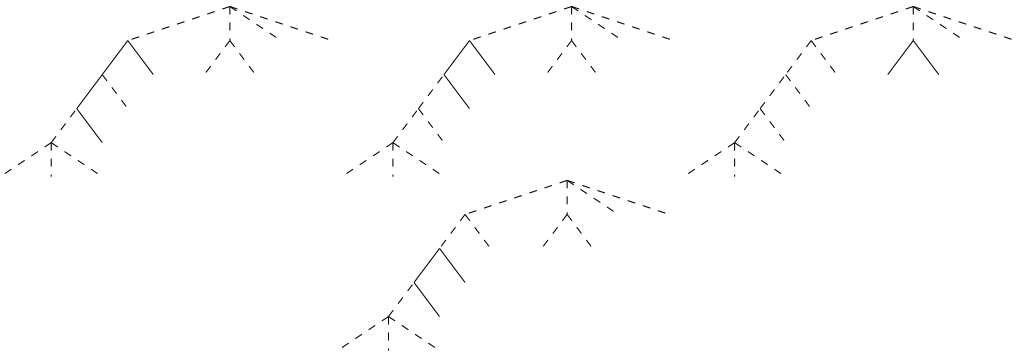
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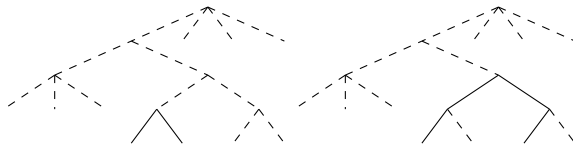
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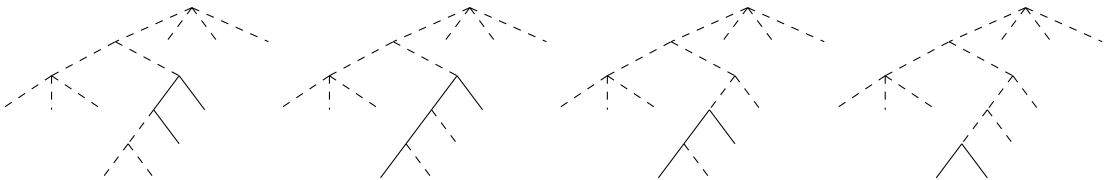
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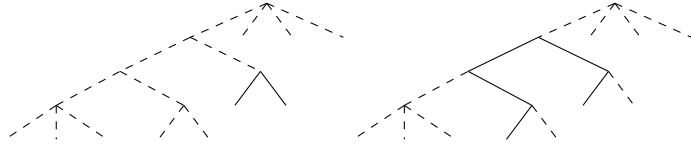


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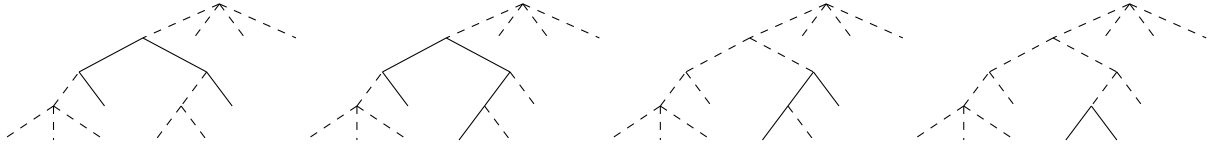




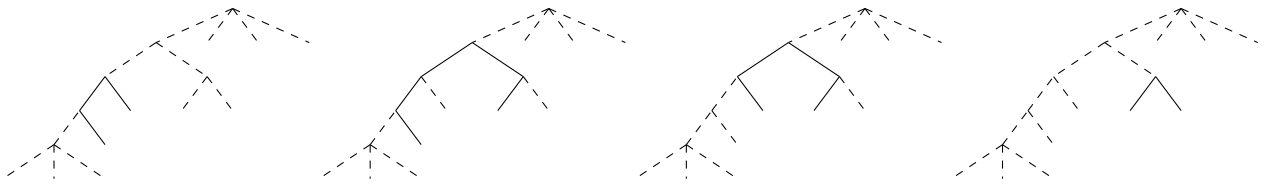
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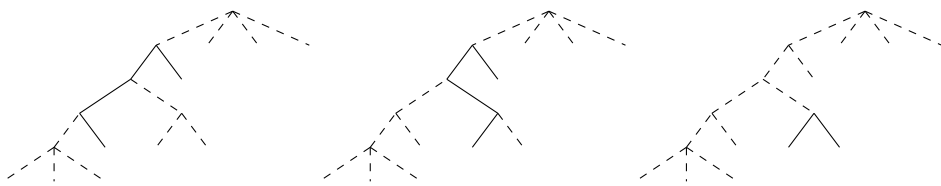
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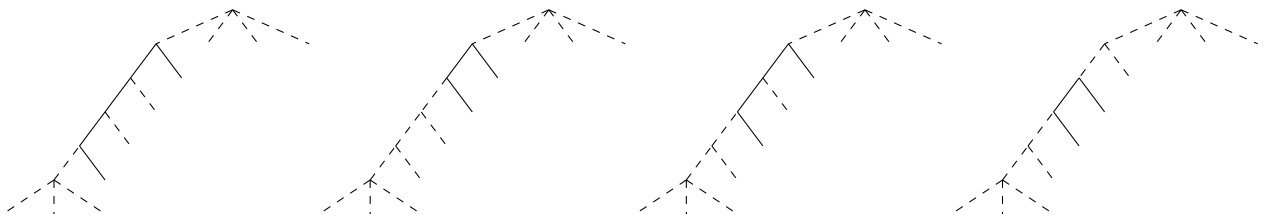
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**Topology 48**



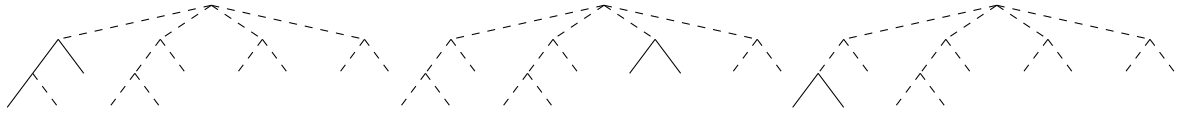
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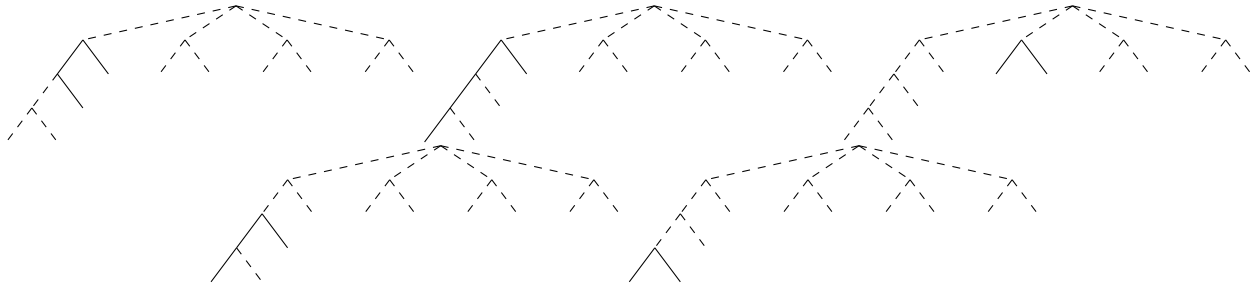
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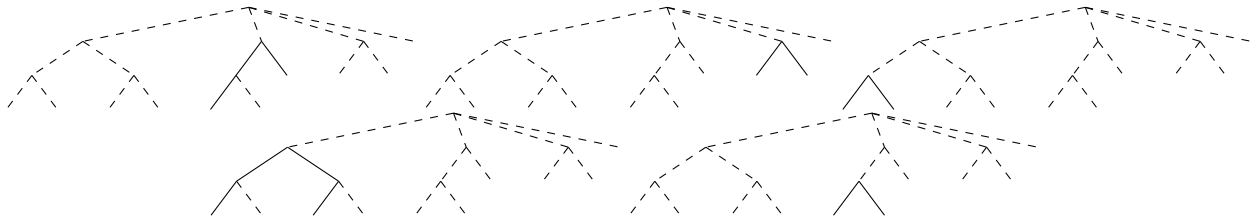
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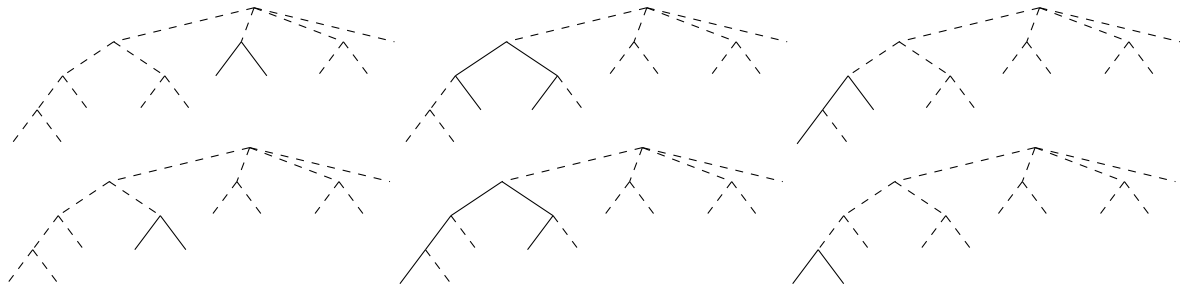
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**Topology 53**



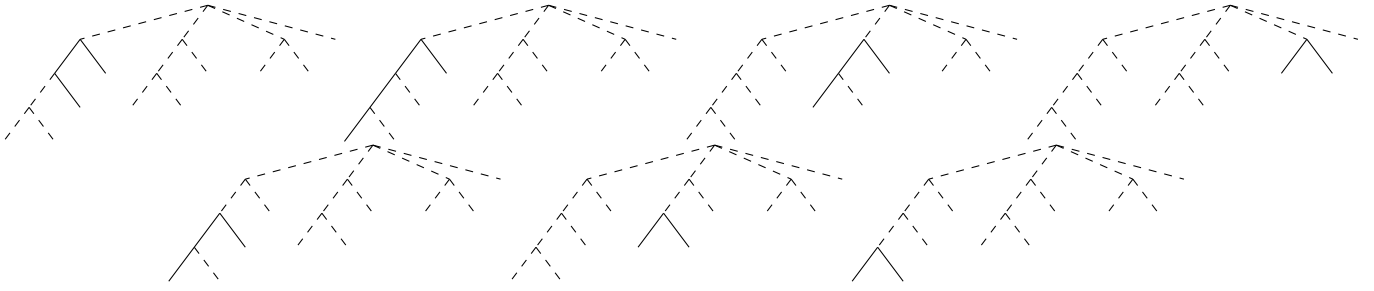
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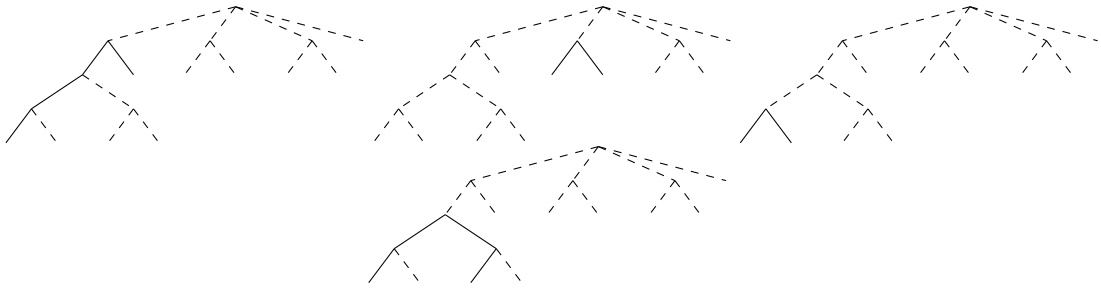
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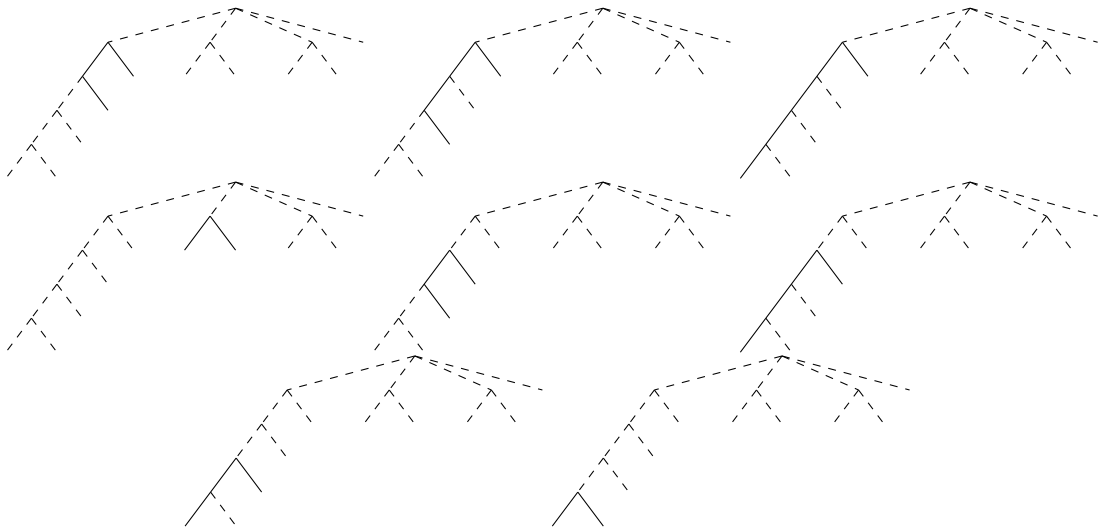
**Topology 56**



**Topology 57**



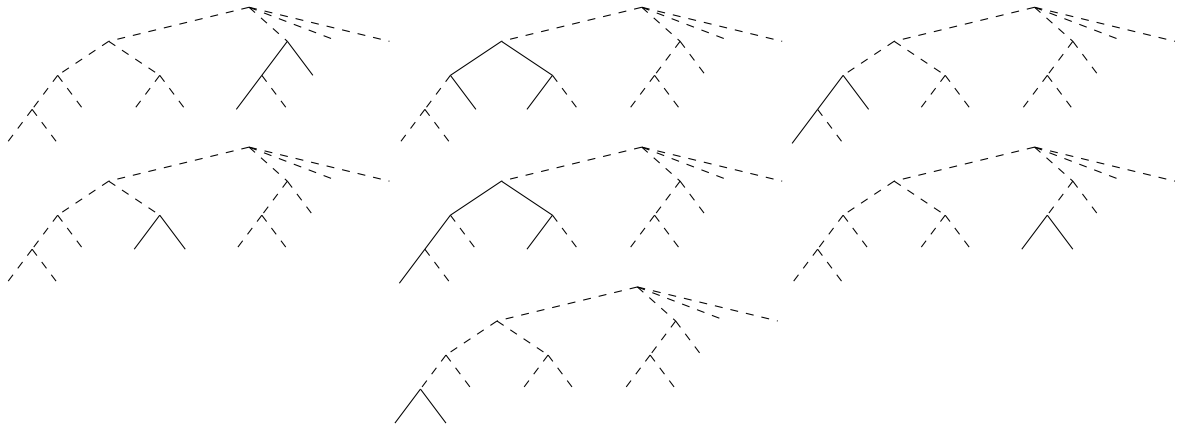
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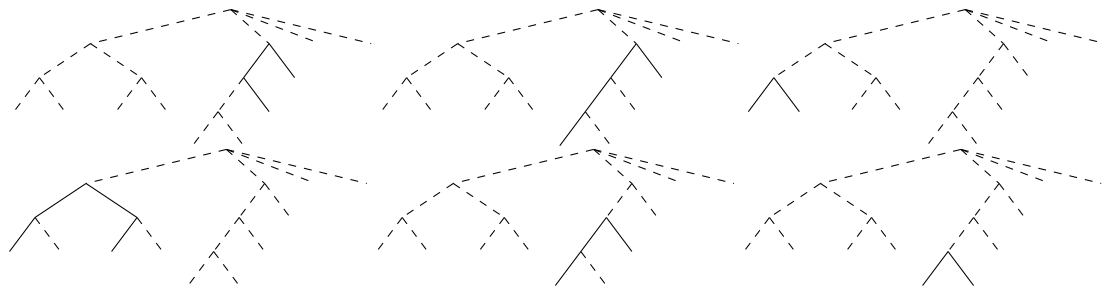
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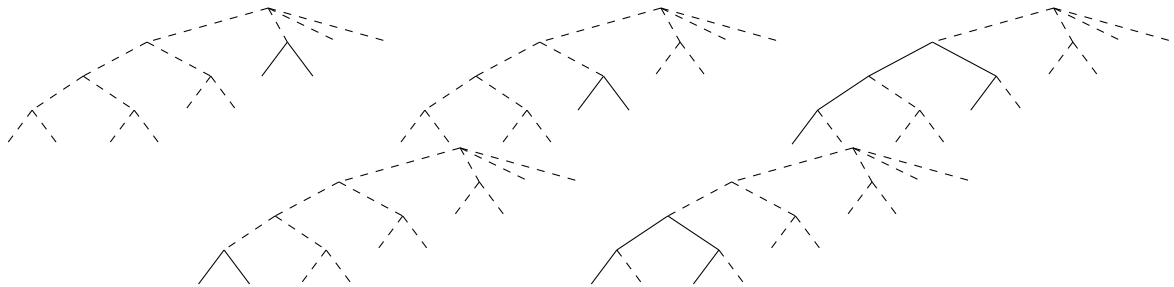
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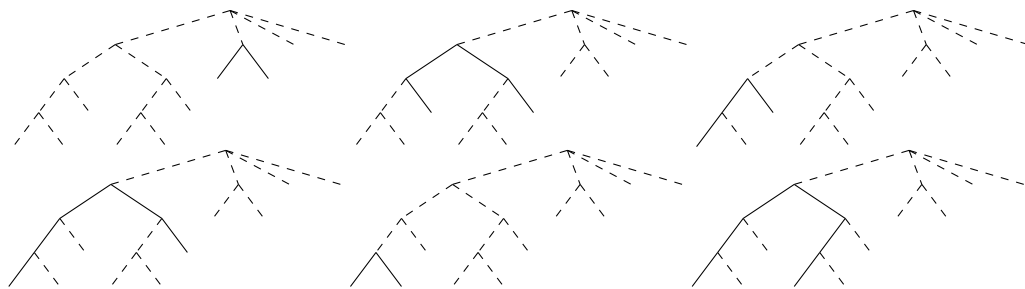
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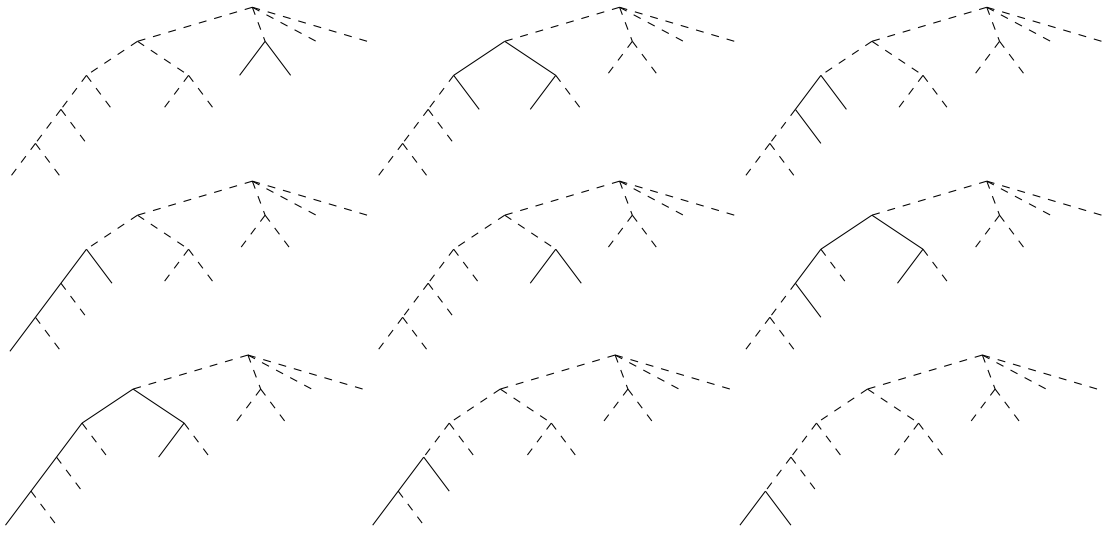
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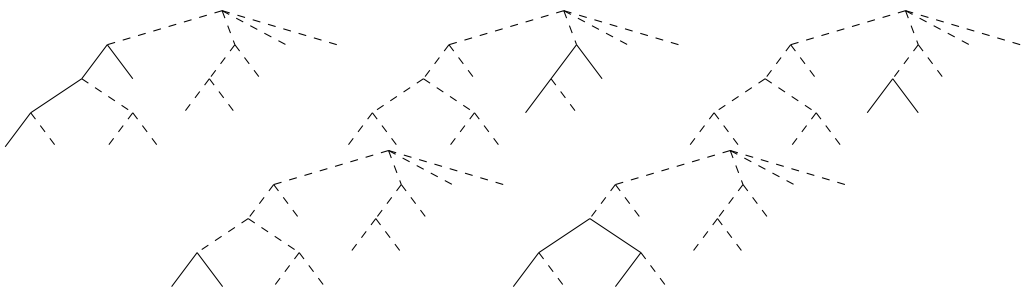
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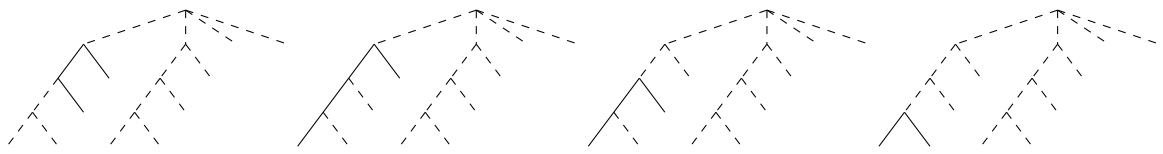
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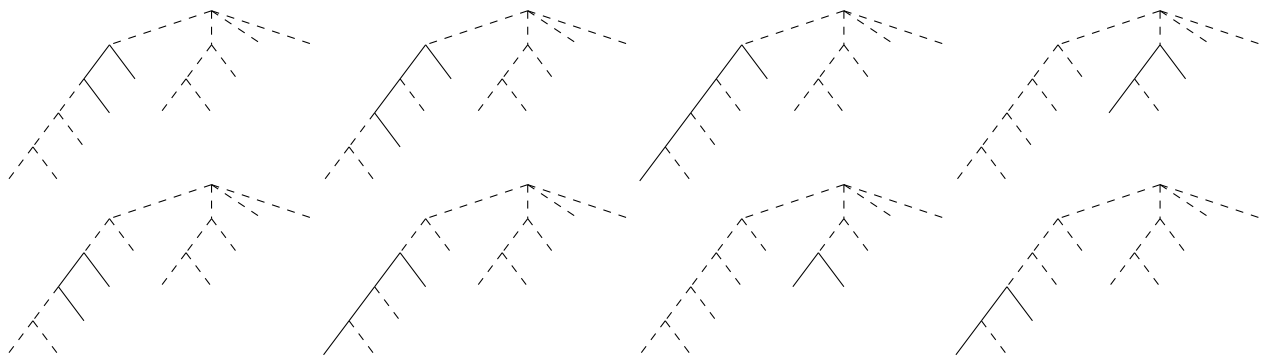
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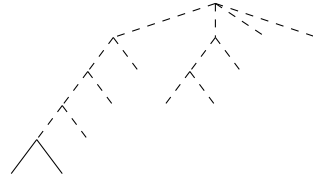


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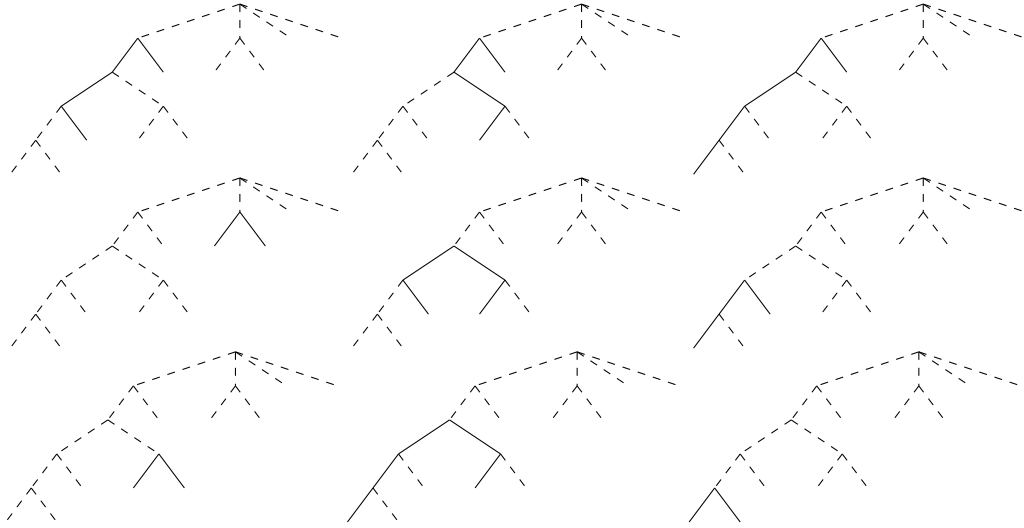


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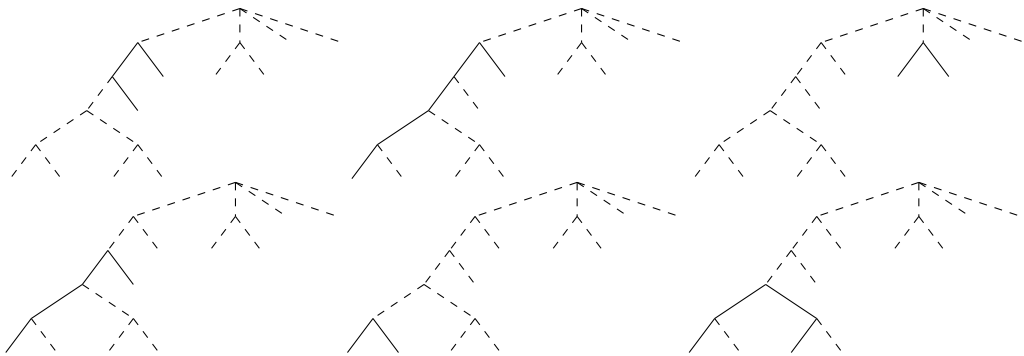




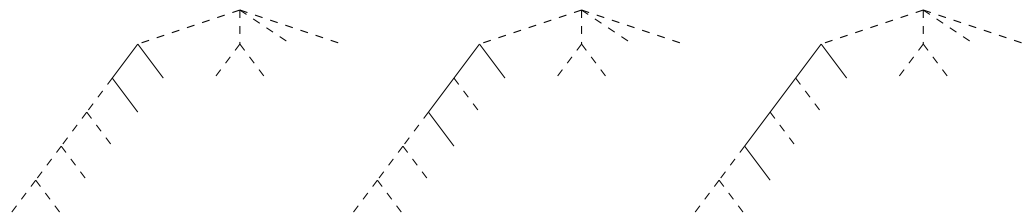
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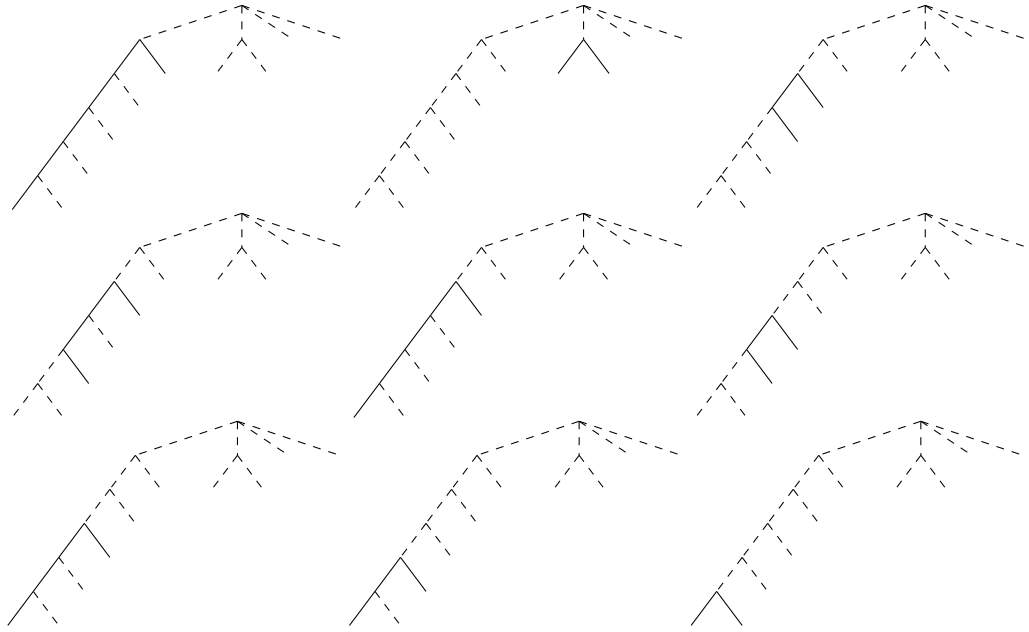


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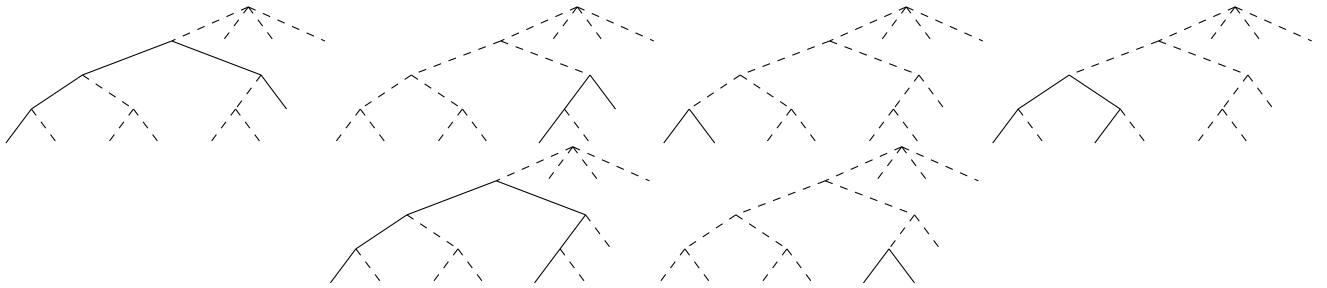


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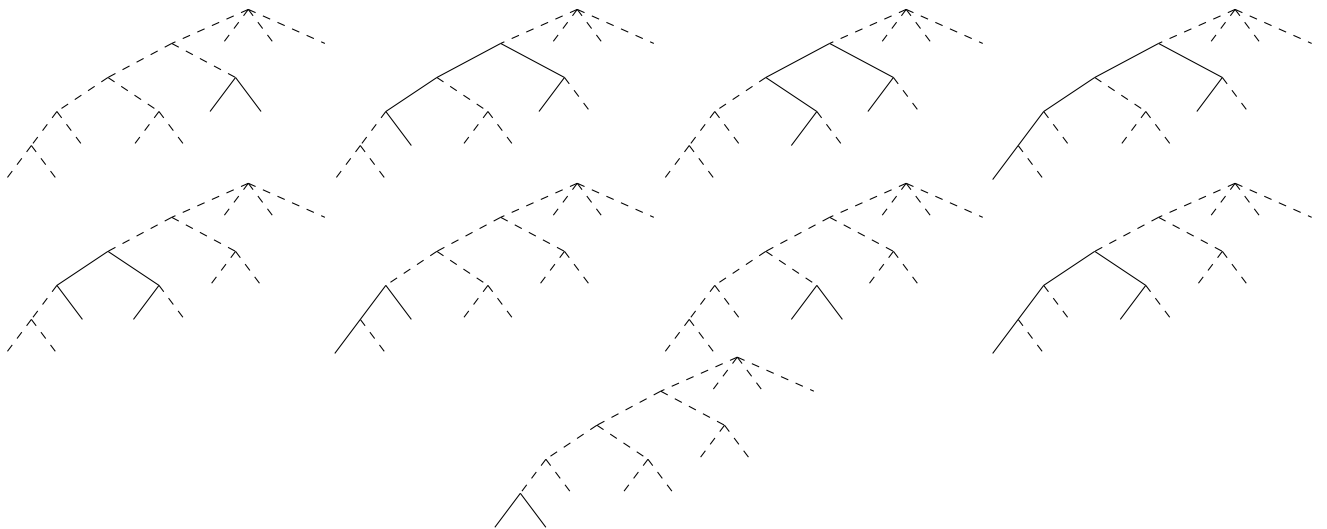




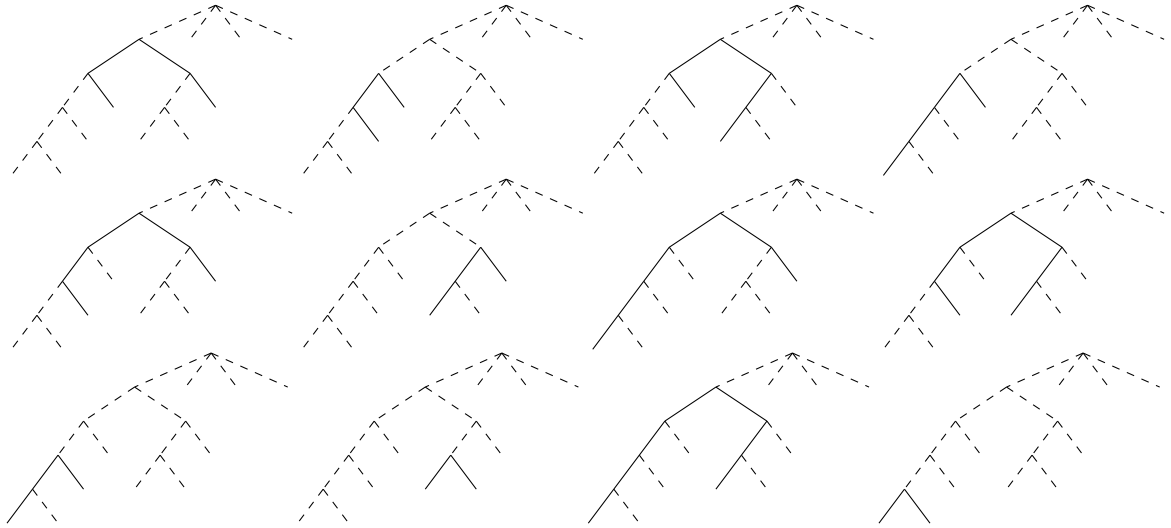
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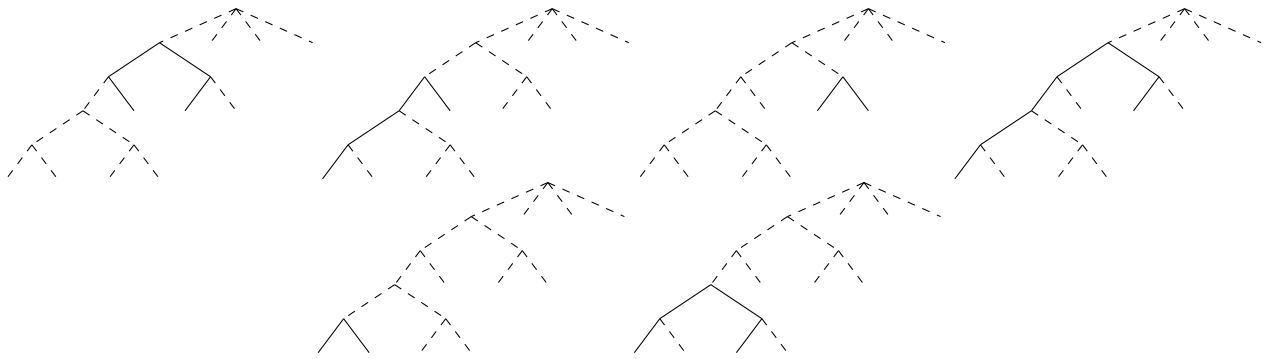
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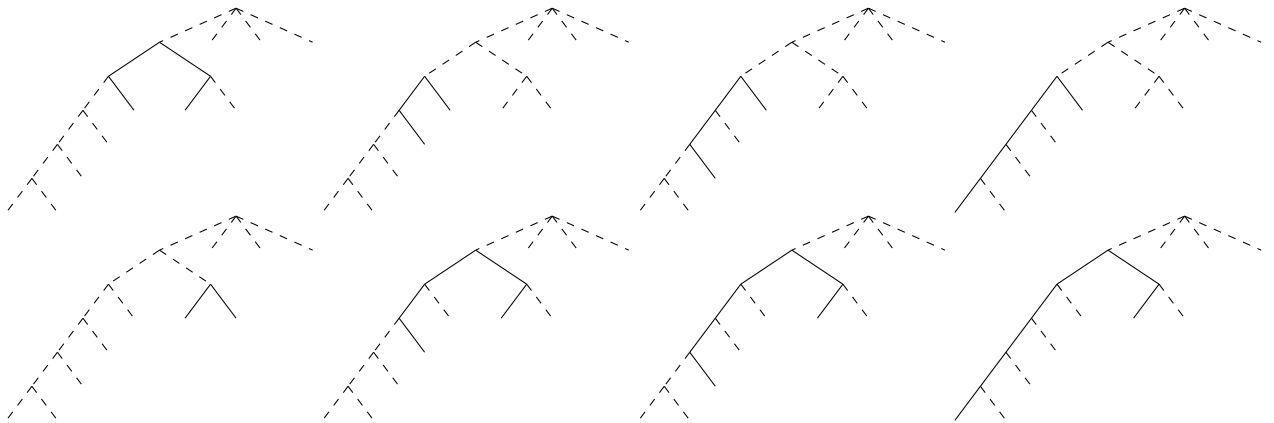
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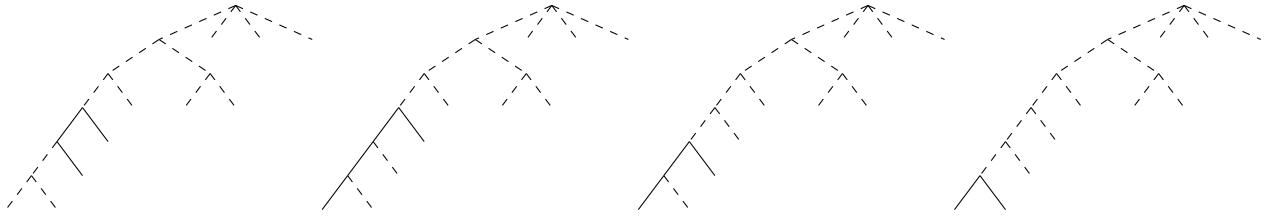
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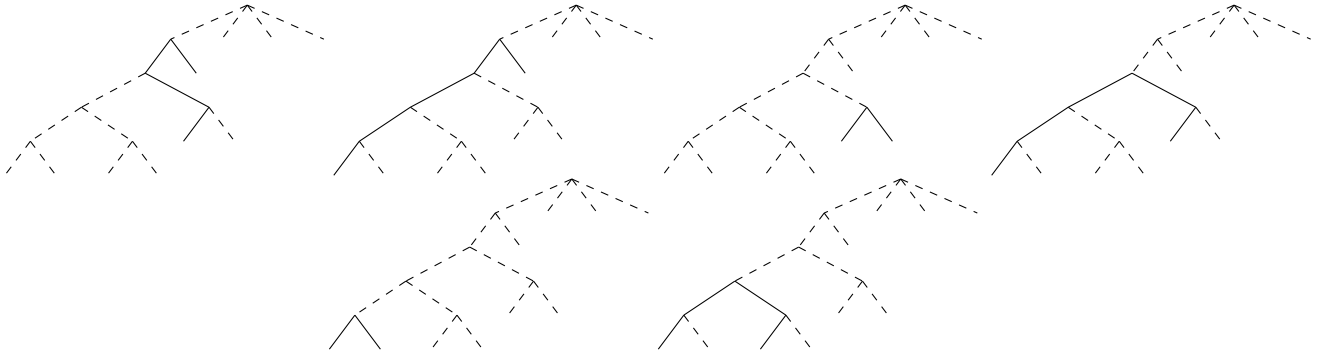
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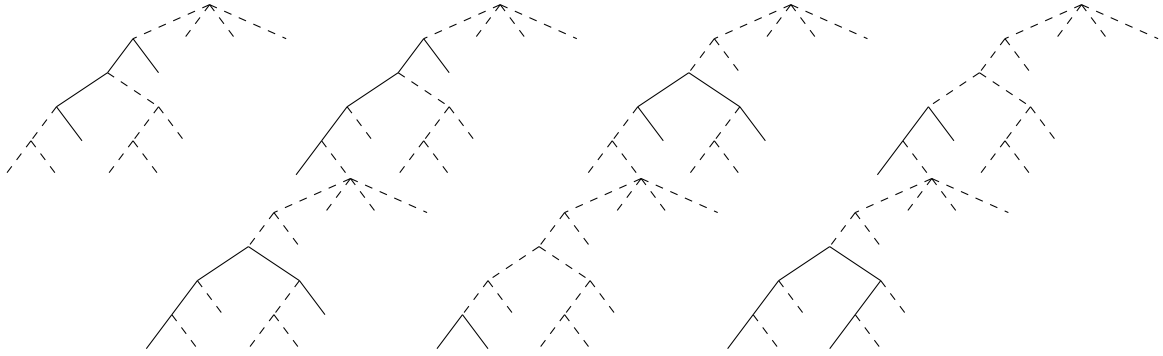




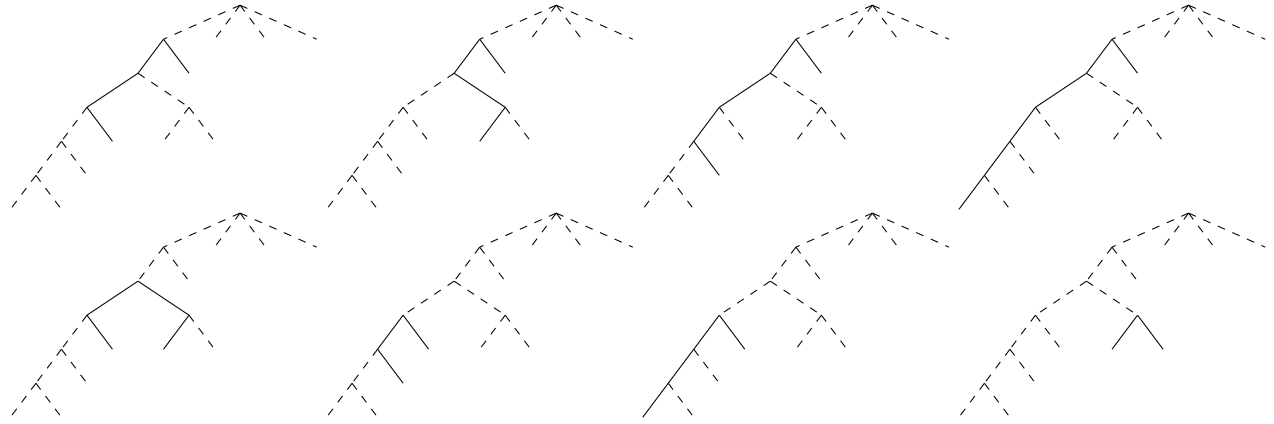
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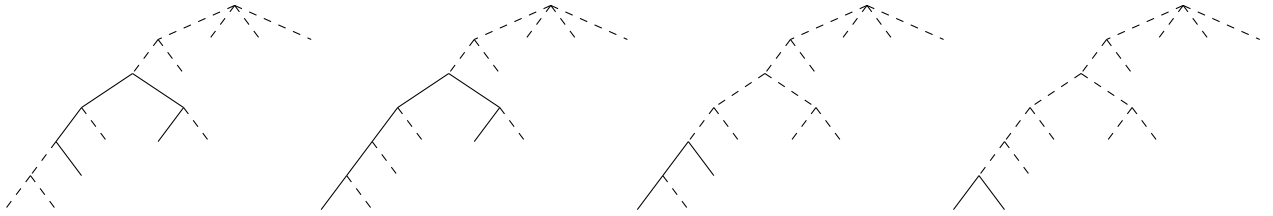


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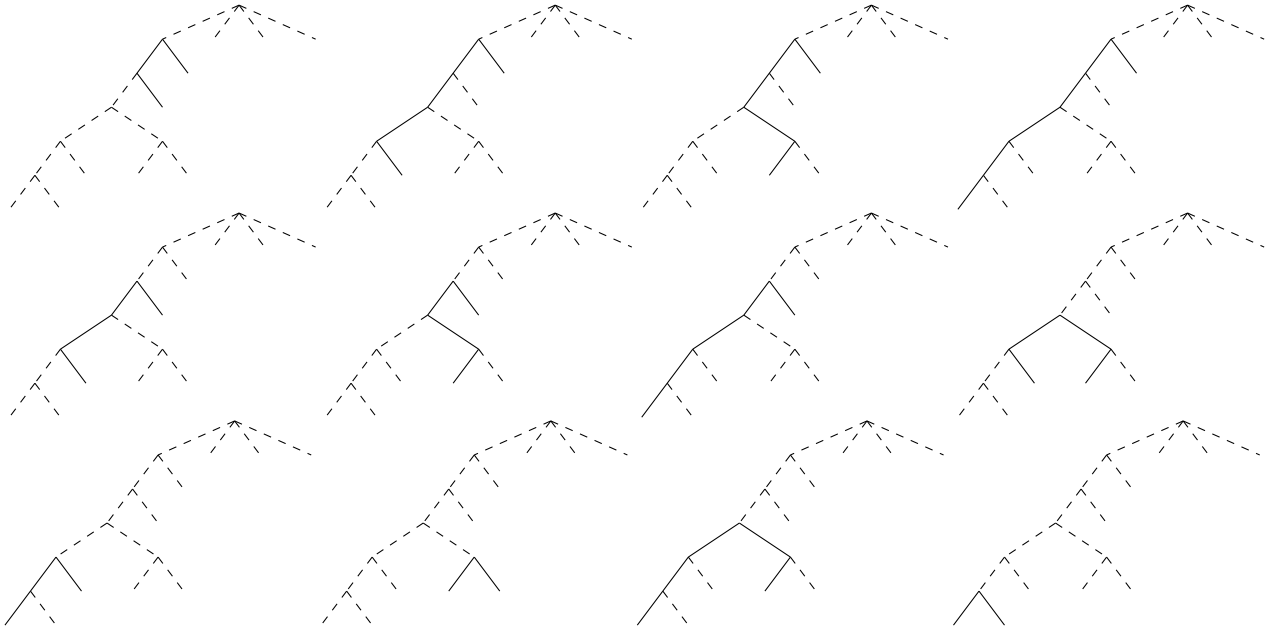


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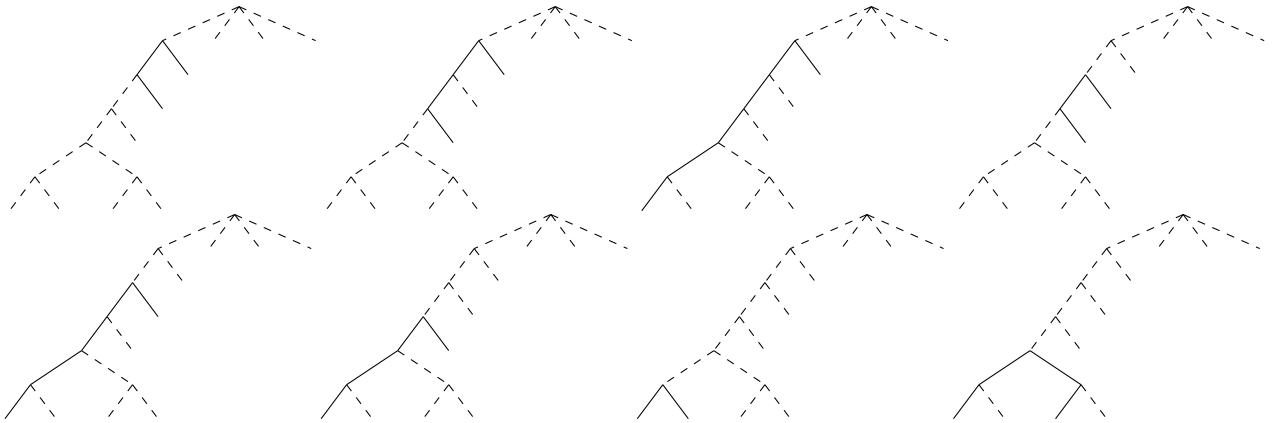




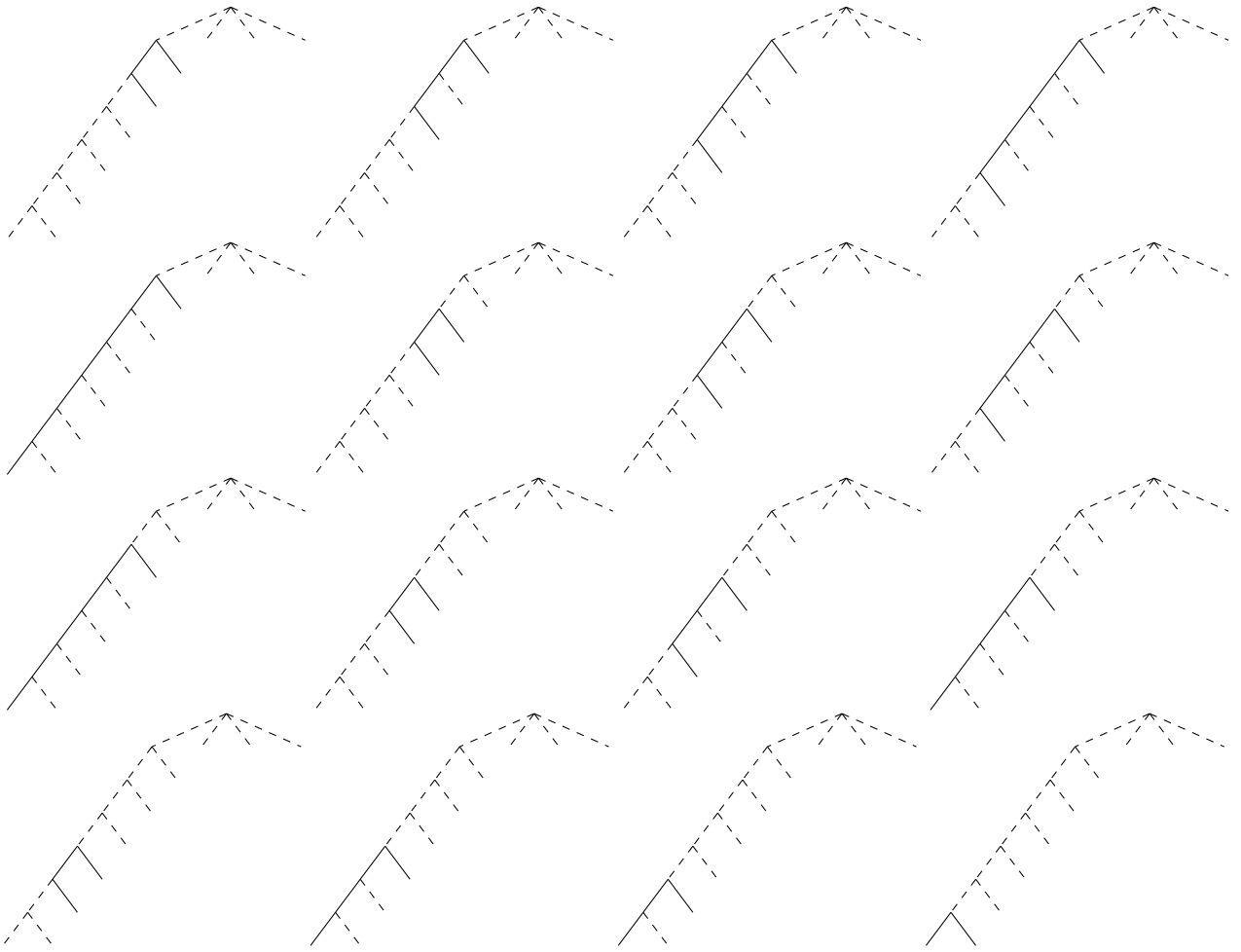
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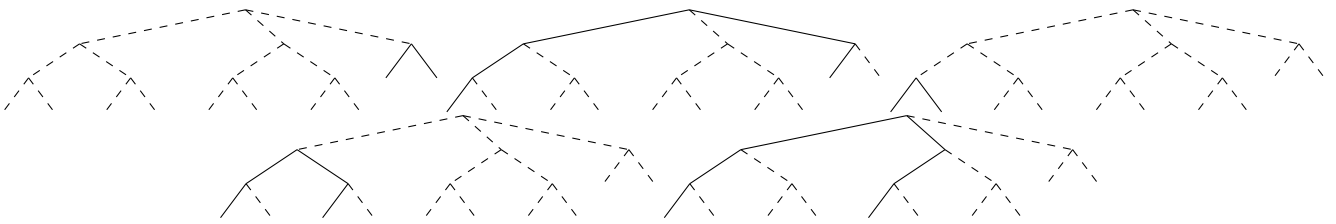
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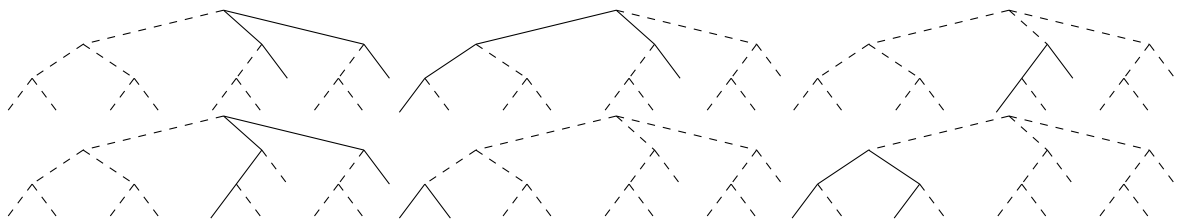
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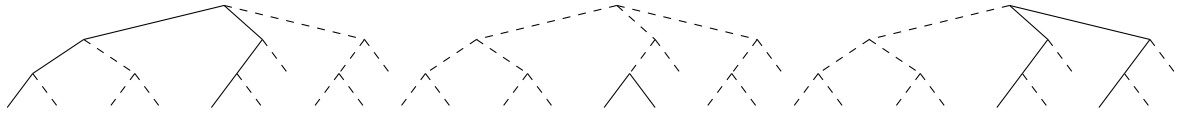


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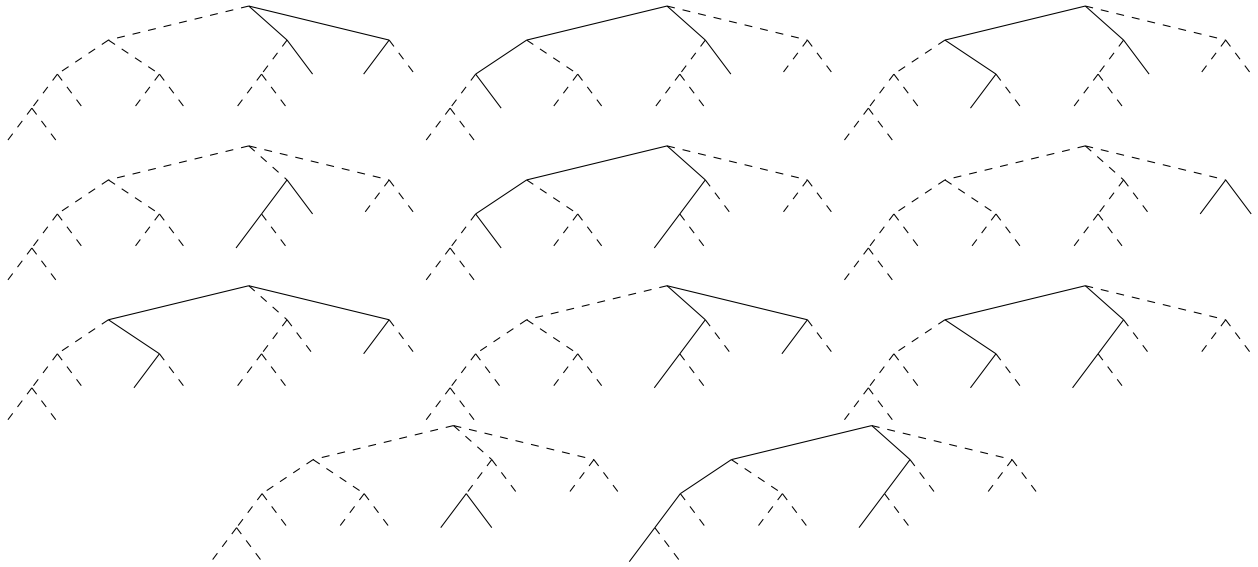


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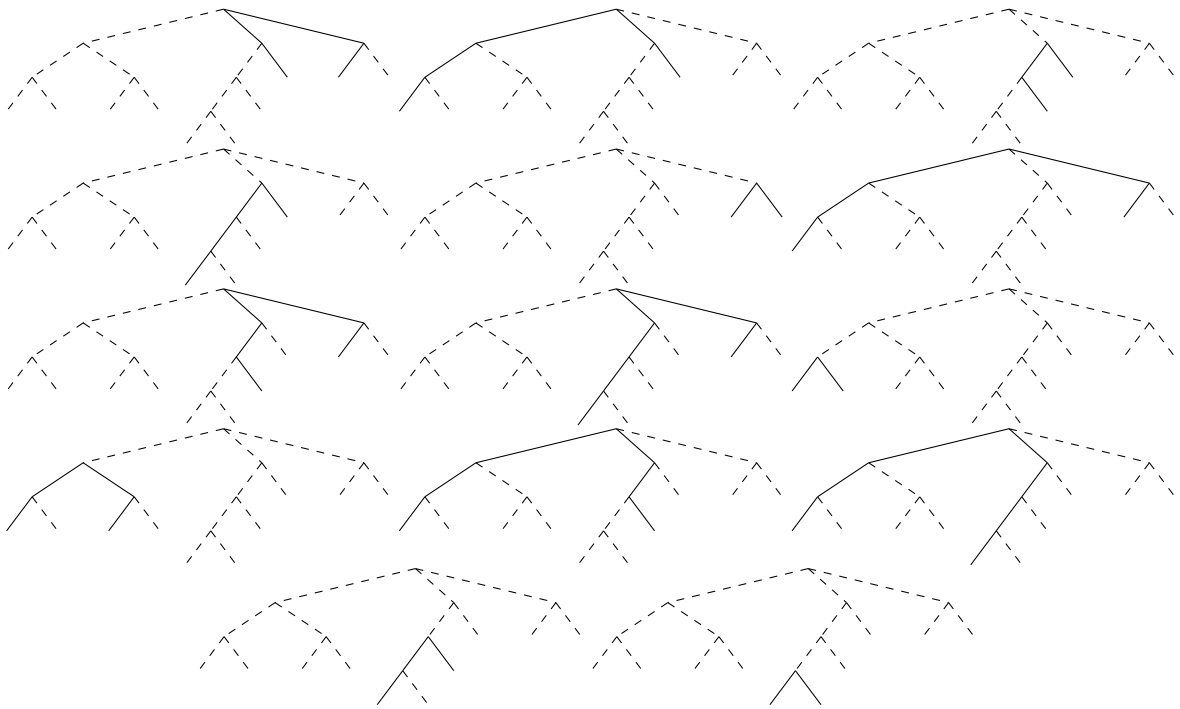




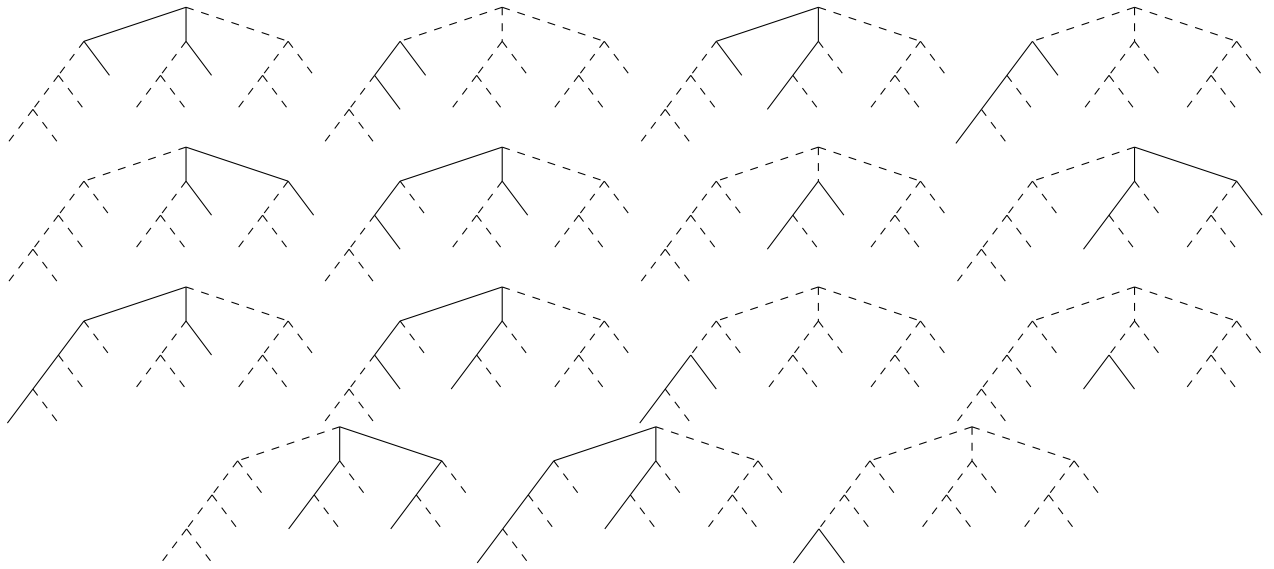
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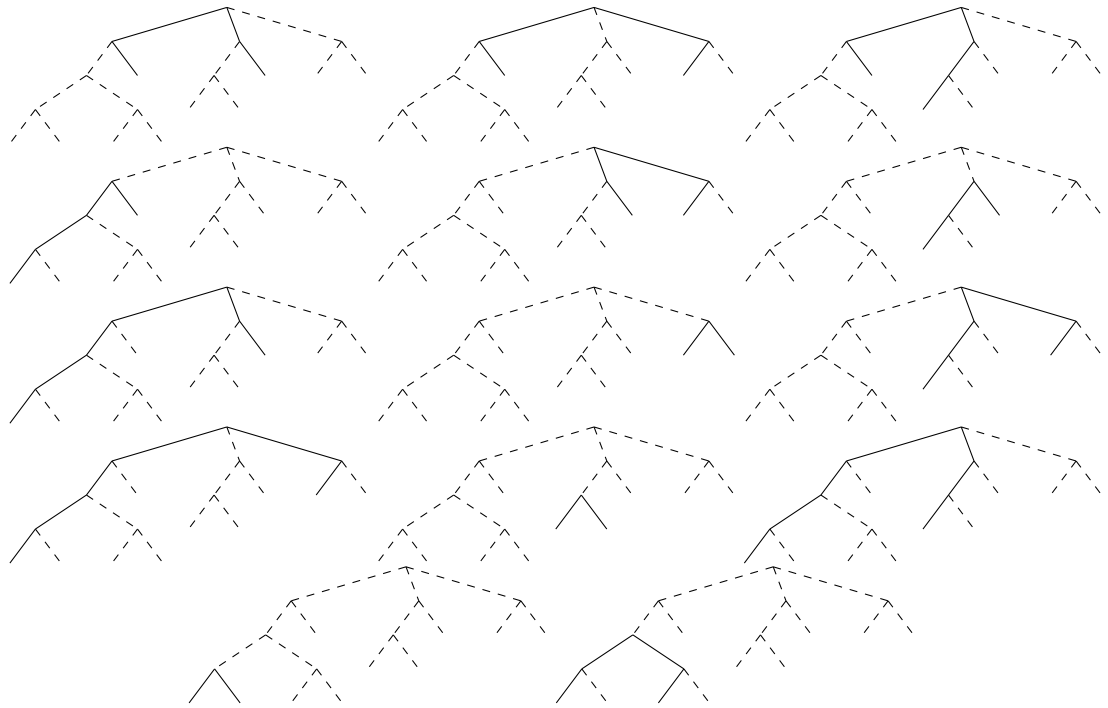
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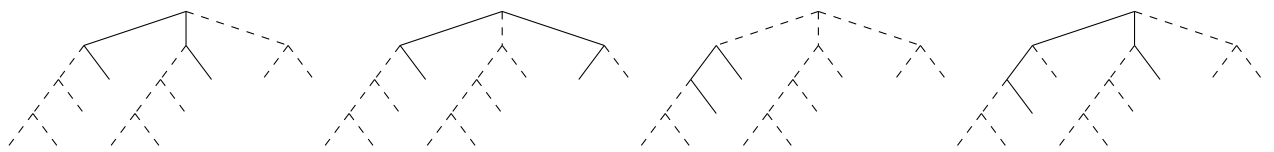
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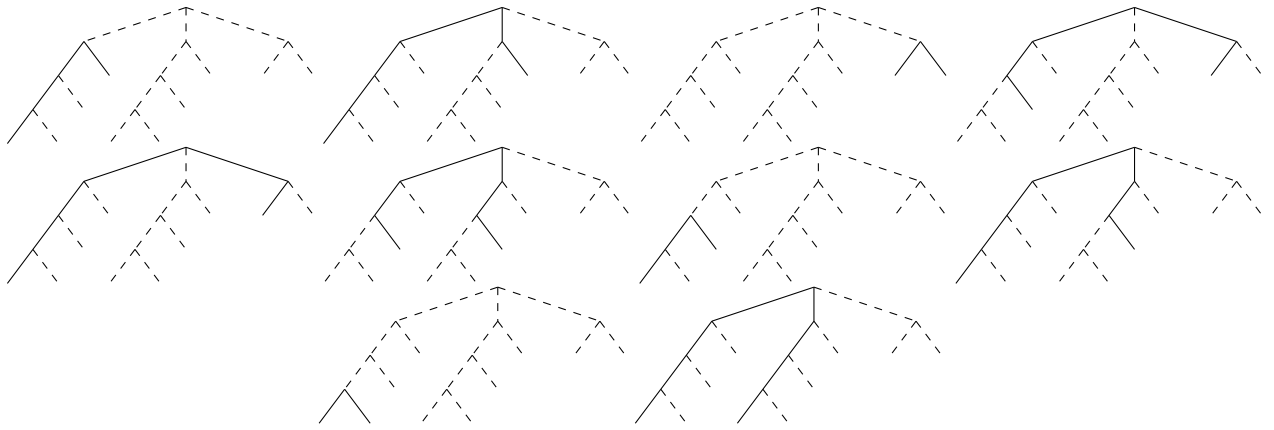


**Topology 87**

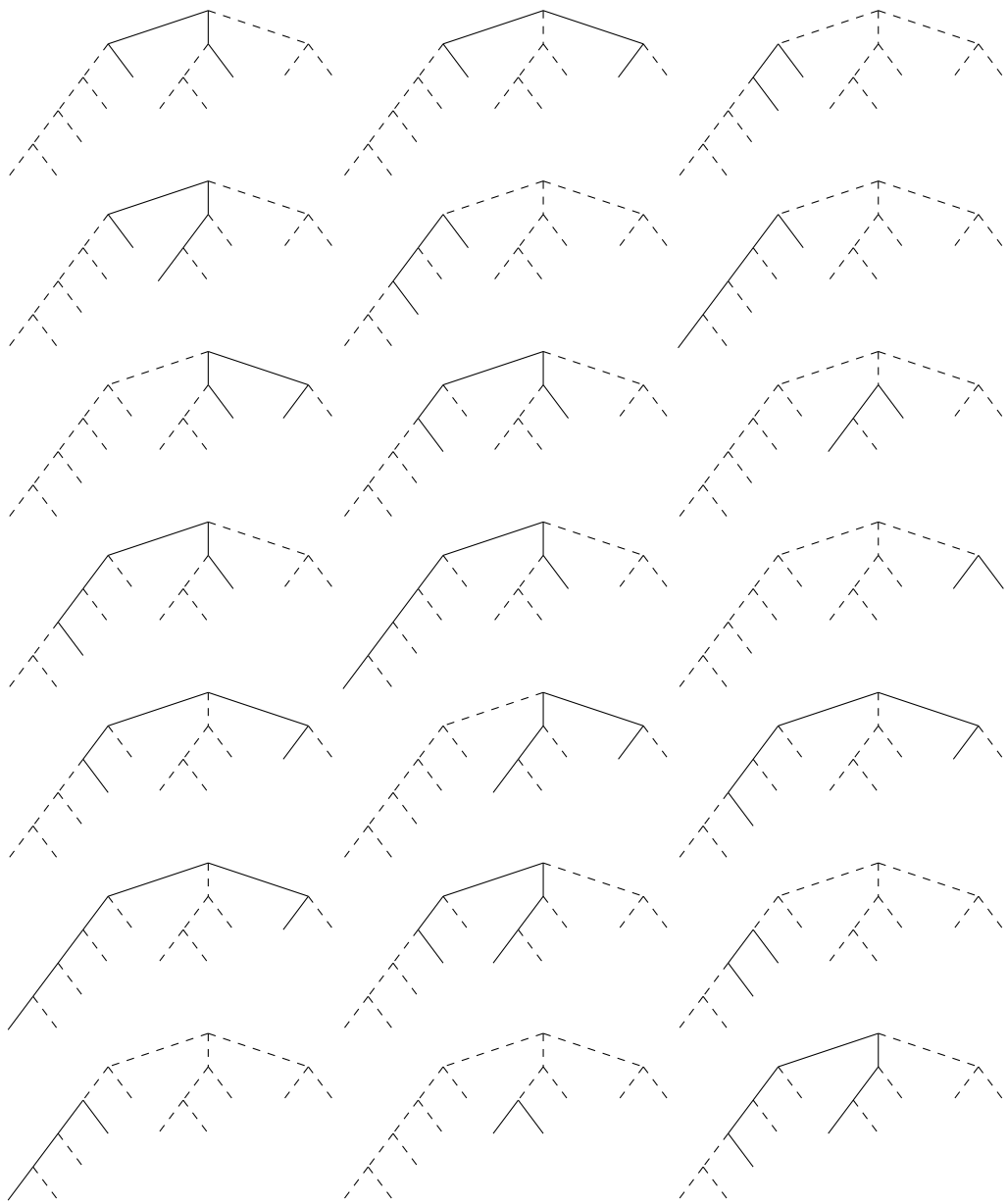


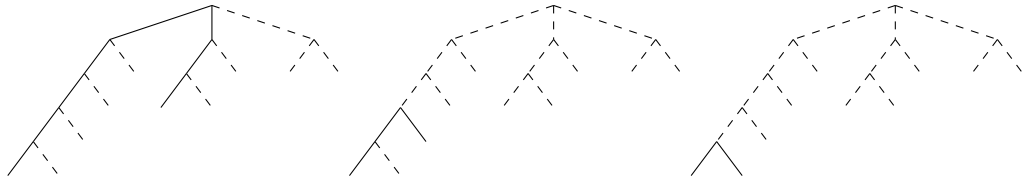
**Topology 88**



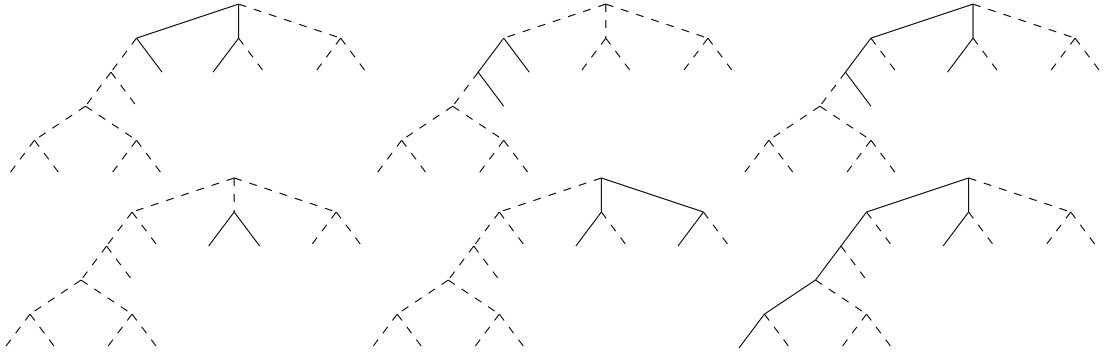


**Topology 89**

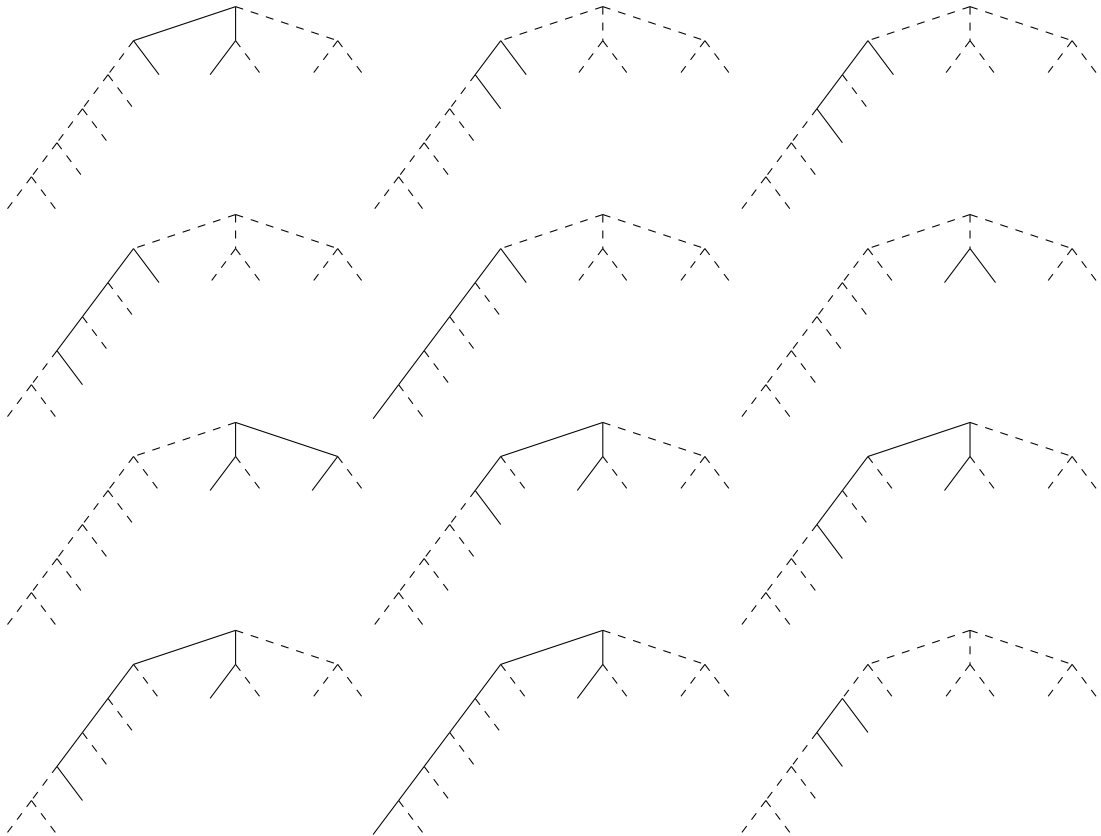


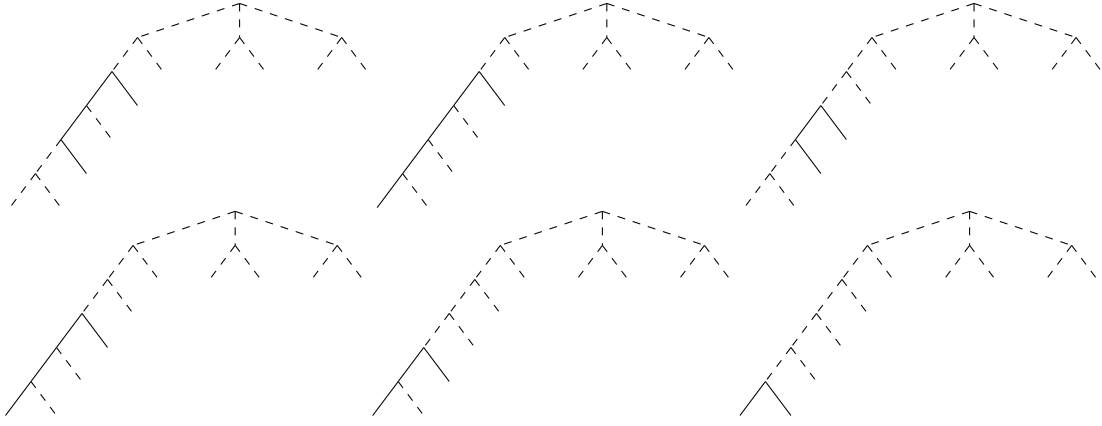


**Topology 90**



**Topology 91**





**Topology 92**

