MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF PHYSICS
CAMBRIDGE, MASSACHUSETTS 02139

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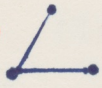
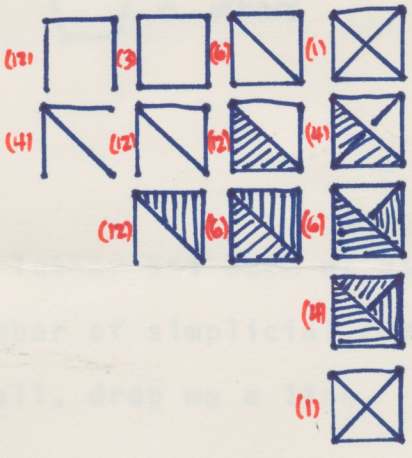
A48143

12 May 1983

Dear Dr. Sloane,

Here is the information I promised you over the telephone. I've diagramed (sort of) the possible connected simplicial complexes and I've put in parentheses the number of labeled complexes of each type.

A48143

N	Topological	Diagrams	Labeled
1	1	(1) •	1
2	1	(1) —•—•	1
3	3	(3)  (1) (1)	5
4	~~13~~ 14	(12)  1 face, 2 faces, 3 faces, (1) solid tetrahedron	~~83~~ 84
⋮	⋮		⋮

hollow tetrahedron

The above sequence contains the subsequence of connected graphs which starts out 1,1,2,6,... and so is one lower bound. My interest in all of this is really in counting a certain subset of the simplicial complexes which arose from my study of the decay of the false

vacuum in the early Universe. These complexes have proved difficult to characterize, but they are (in some ill-defined sense) a representation of connected dominating sets over the connected graphs of N points. This sequence runs 1,1,2,5,19,... and I don't have much faith in my counting of the last (N=5) term. I've drawn these complexes below just in case you might recognize them. I leave a description of their origin to a future letter.

N	Topological	Diagrams	Labeled
1	1	(1) •	1
2	1	(1) •—•	1
3	2	(3) (1)	4
4	5	(12) (6)	35
		(12) (4) 3 faces	
		(1) solid tetrahedron	
5	≈19	+ others	?
⋮	⋮		⋮

I hope this letter has been of use. If you find any information on the number of simplicial complexes, asymptotic behavior or anything at all, drop me a line.

Yours truly,

Greg Huber

Greg Huber

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14 May 1983

Dear Dr. Sloane,

As you may have noticed, I miscounted on page one of my first letter. The N=4 term should be 14 (not 13) and the corresponding labeled term is 84 (and not 83). I forgot to include the tetrahedral shell of four faces; so the sequence starts 1, 1, 3, 14, ...

I've made a rough estimate of the number of topologically distinct connected simplicial complexes of five points (the N=5 term) and it's approx. 150.

I don't think I've sent you any more mistakes. Hope to hear from you soon.

Greg Huber

12 May 1983

over the telephone.

cted simplicial com-

er of labeled complexes

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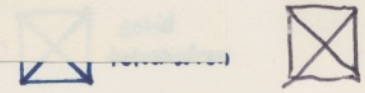
Labeled
1
1
5
~~83~~ 84
⋮

hollow tetrahedron



The above sequence contains the subsequence of connected graphs which starts out 1,1,2,6,... and so is one lower bound. My interest in all of this is really in counting a certain subset of the simplicial complexes which arose from my study of the decay of the false