

Small Group Divisible Designs with Block Size Three

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Abstract

Necessary conditions for the existence of group divisible designs with block size three are developed. A computation is described that establishes the sufficiency of these conditions for sixty and fewer elements.

1 Introduction

Let \mathcal{X} be a finite set of v elements, and let $G = \{G_1, G_2, \dots, G_s\}$ be a partition of \mathcal{X} into subsets called *groups*. Let \mathcal{B} be a collection of subsets of \mathcal{X} called *blocks*, and set $\mathcal{K} = \{|B| : B \in \mathcal{B}\}$, the *set of block sizes*. If $(\mathcal{X}, \mathcal{B})$ has the property that every pair of elements either appears in exactly one block or in exactly one group it is a *group divisible design*, and is denoted by \mathcal{K} -GDD. The *type* of the GDD is $z_1^{t_1} z_2^{t_2} z_3^{t_3} \dots z_s^{t_s}$ when the number of groups of size z_i is t_i . In this paper we examine the case $\mathcal{K} = \{3\}$. We first determine a number of necessary conditions on the possible types of $\{3\}$ -GDD. We then describe a computation using hill-climbing that establishes the sufficiency of these conditions for $v \leq 60$. The techniques employed apply for larger orders; however, storage limitations forced us to limit the order to 60; specific cases for larger orders can be addressed by the techniques developed here.

2 Necessary Conditions

Suppose that a $\{3\}$ -GDD exists having s groups, with group sizes g_1, \dots, g_s ; by convention, we order the group sizes so that $g_1 \geq g_2 \geq \dots \geq g_s$.

What conditions must the group sizes g_1, \dots, g_s satisfy? We establish the following necessary conditions:

Lemma 2.1 *A $\{3\}$ -GDD on v elements with group sizes $g_1 \geq g_2 \geq \dots \geq g_s$ exists only if:*

1. $\binom{v}{2} \equiv \sum_{i=1}^s \binom{g_i}{2} \pmod{3}$;
2. $v \equiv g_i \pmod{2}$ for all $i = 1, \dots, s$;
3. $g_1 \leq \sum_{i=3}^s g_i$;
4. $v_0(v - v_0) \leq 2 \left[\binom{v_0}{2} + \binom{v-v_0}{2} - \sum_{i=1}^s \binom{g_i}{2} \right]$, whenever $v_0 = \sum_{i=1}^s \alpha_i g_i$ and $\alpha_i \in \{0, 1\}$, $i = 1, \dots, s$;
5. $2g_2g_3 \geq g_1 [g_2 + g_3 - \sum_{i=4}^s g_i]$;
6. and if $g_1 = \sum_{i=3}^s g_i$, $2g_3g_4 \geq (g_1 - g_2) [g_3 + g_4 - \sum_{i=5}^s g_i]$.

Proof:

Condition (1) follows from the fact that each triple uses three pairs, so the number of pairs must be a multiple of three. For condition (2), observe that every element must be in an even number of pairs, and hence that $v - g_i$ must be even. For condition (3), consider one of the g_2 elements in the second group. It appears in g_1 distinct triples with elements of the first group, and in each such triple the third element is not in the first two groups. For condition (4), consider the partition of the v elements into two sets, one of size v_0 and the other of size $v - v_0$. By construction, each group lies entirely within one of the sets. Thus the right hand side of the inequality gives twice the number of pairs inside the two sets that must appear in triples, while the left hand side gives the number of pairs that contain one element from each set. Since every triple must use at least one edge inside one of the sets, the inequality follows.

For condition (5), we proceed as follows. If we delete all elements of the first group, the result must be a $\{2, 3\}$ -GDD with group sizes g_2, \dots, g_s having g_1 parallel classes of edges. Consider the g_1 -regular graph that is the union of these parallel classes. Partition the elements into three classes V_1, V_2, V_3 , where V_1 contains the g_2 elements of the second group, V_2 contains the g_3 elements of the third group, and V_3 contains the $\sum_{i=4}^s g_i$ elements of the remaining groups. Let ϵ_{ij} be the number of edges with one endpoint in V_i and the other in V_j . Evidently, $\epsilon_{11} = \epsilon_{22} = 0$ and $\epsilon_{ij} = \epsilon_{ji}$. We obtain the following system of equations:

$$\epsilon_{12} + \epsilon_{13} = g_1 g_2 \quad (1)$$

$$\epsilon_{12} + \epsilon_{23} = g_1 g_3 \quad (2)$$

$$\epsilon_{13} + \epsilon_{23} + 2\epsilon_{33} = g_1 \left(\sum_{i=4}^s g_i \right) \quad (3)$$

Now $\epsilon_{12} \leq g_2 g_3$, and thus we obtain $\epsilon_{23} \geq g_3(g_1 - g_2)$ and $\epsilon_{13} \geq g_2(g_1 - g_3)$. Thus $2\epsilon_{33} \leq g_1(\sum_{i=4}^s g_i - g_2 - g_3) + 2g_2 g_3$, or $2(g_2 g_3 - \epsilon_{33}) \geq g_1(g_2 + g_3 - \sum_{i=4}^s g_i)$. Since $\epsilon_{33} \geq 0$, the inequality follows.

Condition (6) is obtained similarly, by observing that if $g_1 = \sum_{i=3}^s g_i$, deleting all elements of the first two groups leaves a $\{2, 3\}$ -GDD with group sizes g_3, \dots, g_s in which the pairs form a $(g_1 - g_2)$ -regular graph. \square

We make some remarks on these necessary conditions. Condition (4) can be obtained directly by treating the $\{3\}$ -GDD as a partial Steiner triple system and applying the known necessary conditions for leave graphs [3]. In the general case of leaves, one would try *all* partitions of the elements. For $\{3\}$ -GDD, however, one need only consider those partitions that do not split the elements of any group.

Conditions (5) and (6) do not appear to follow from any of the known necessary conditions for leave graphs. In fact, it is not clear in advance that they are not subsumed by condition (4). However, group sizes $(13, 7, 7, 1, 1, 1, 1, 1)$ meet conditions (1)-(4) but fail to meet condition (5) (since $2 \cdot 7 \cdot 7 \not\geq 13(7+7-6)$). In addition, it is not clear in advance that condition (6) is needed given conditions (1)-(5). However, $(31, 11, 11, 11, 1, 1, 1, 1, 1, 1, 1)$ meets conditions (1)-(5), but fails to meet condition (6) (since $2 \cdot 11 \cdot 11 \not\geq (31 - 11) \cdot (11 + 11 - 9)$).

It appears likely that these conditions will not be sufficient in general, as one expects further structural conditions such as (5) and (6). In fact, conditions (4), (5) and (6) all result from the requirement that one must be able to find g_1 disjoint 1-factors in a complete multipartite graph K_{g_2, \dots, g_s} , but are not by themselves sufficient to ensure that such a set of 1-factors exists.

Our objective in studying small $\{3\}$ -GDD is in part to uncover necessary conditions such as (5) and (6); more importantly, however, we are interested in obtaining a complete result for small orders. The motivation

is perhaps clear: our ability to apply recursive constructions is in direct proportion to the availability of small cases to use as ingredients.

We note then that the conditions of Lemma 2.1 are known to be sufficient when all group sizes are equal or when all but one are equal [2], and when there are some groups of size u and the remainder have size one [1]. Beyond this, no general results on sufficiency are available, although numerous direct and recursive constructions are known [1,2].

3 Sufficiency for $v \leq 60$

We set out to determine, for all small orders, when the conditions of Lemma 2.1 are sufficient. Remarkably, using some simple computational tools, we find that these conditions are sufficient for all $v \leq 60$.

For each order v in turn, we first generate all partitions of v that meet conditions (1) and (2) of Lemma 2.1. We then filtered these to obtain the list of all partitions meeting the necessary conditions. Call a group type *admissible* if it satisfies the conditions of Lemma 2.1. Many of these group types can be obtained from another admissible group type by filling in one group. In order to establish sufficiency, we need only treat admissible group types that are not formed by filling in groups in this way; call such a group type *primitive*. We further restricted our list of group types to determine the set of primitive group types.

Here we list the numbers of admissible and primitive group types for each $v \leq 60$. We write $v = 5a + b$; then the (a, b) entry of the following table gives the numbers of admissible and primitive types:

a b	1	2	3	4	5
0	0, 0	0, 0	1, 1	0, 0	0, 0
1	1, 1	2, 1	1, 1	4, 1	1, 1
2	1, 1	2, 2	5, 1	3, 2	8, 3
3	3, 2	5, 1	7, 3	15, 4	8, 4
4	24, 4	9, 4	20, 5	16, 7	39, 6
5	21, 9	54, 9	25, 11	53, 9	38, 13
6	90, 13	48, 18	122, 16	60, 21	136, 22
7	85, 26	209, 29	111, 34	272, 31	138, 42
8	312, 41	182, 50	440, 51	233, 64	568, 58
9	295, 76	667, 78	375, 93	905, 92	477, 112
10	1143, 106	597, 139	1392, 137	745, 167	1785, 162
11	937, 198	2235, 189	1175, 238	2759, 237	1426, 284

For each primitive type, we constructed a $\{3\}$ -GDD of that type. The basic tool employed is a variant of Stinson's hill-climbing algorithm [4]. We outline the method here:

```

found = false
triples = { }
tries = 0
while not found and (tries < maxtries) do
  if there is no unused pair then
    found = true
  else
    tries = tries + 1
    select an unused pair {x,y} at random
    select an unused pair {x,z} at random
    if y and z are in different groups then
      if {y,z} is unused then
        add {x,y,z} to triples
        tries = 0
      else
        remove the triple {w,y,z} containing {y,z}
        add {x,y,z} to triples
  od
if found then output triples else output "fail"

```

For most of the primitive group types, we employ the algorithm given here with $\text{maxtries} = 2000$. In each case, we attempt to construct the $\{3\}$ -GDD up to one hundred times. This approach proves quite effective; for only 197 of the primitive group types did we obtain a "fail" in each of the one hundred attempts. In these remaining cases, we proceed as follows. We adapt the hill-climbing algorithm to run in two phases. In the first phase, we consider only triples that do not involve an element of the largest group (of size g_1). We enforce the condition that the number of unused pairs at each element not in the largest group remains at least g_1 . When the number of unused pairs at each such element becomes equal to g_1 , the first phase is complete. The second phase then hill-climbs to add the remaining triples, *without* removing any of the triples chosen in the first phase. In particular, if $\{y, z\}$ is found to appear in a triple selected in the first phase, the replacement of $\{w, y, z\}$ by $\{x, y, z\}$ is not done. When the first phase completes, a partial *GDD* has been found on all but the largest group, which leaves uncovered precisely the pairs of a g_1 -regular graph; the second phase is essentially determining a proper edge-colouring of this

graph in order to add the largest group. This two-phase approach seems to overcome the problems encountered in the cases with frequent failures; what appears to happen in those cases in the basic algorithm is that too many triples are chosen that do not involve elements of the largest group, and hill-climbing takes too many iterations to reduce this number.

In any event, the two-phase hill-climbing approach produced solutions for *all* of the remaining primitive group types. Naturally, it is not feasible to list the $\{3\}$ -GDD found. We do, however, list all of the primitive group types for which $\{3\}$ -GDD were found; the corresponding designs support the sufficiency of the conditions of Lemma 2.1 for all $v \leq 60$.

- 3: 1^3 6: 2^3 7: $3^1 1^4$ 8: 2^4 9: 3^3 10: $4^1 2^3$
11: $5^1 1^6$ 12: $2^6, 4^3$ 13: $3^4 1^1$ 14: $4^3 2^1, 6^1 2^4$
15: $3^5, 5^3, 7^1 1^8$ 16: $4^4, 6^1 4^1 2^3$ 17: $5^1 3^4$
18: $6^1 4^3, 6^3, 8^1 2^5$
19: $3^6 1^1, 5^3 3^1 1^1, 7^1 3^4, 9^1 1^{10}$
20: $6^1 4^3 2^1, 6^3 2^1, 8^1 2^6, 8^1 4^3$
21: $5^3 3^2, 7^1 3^4 1^2, 7^3, 9^1 3^4$
22: $6^1 4^4, 6^3 4^1, 8^1 6^1 4^1 2^2, 10^1 2^6$
23: $5^4 3^1, 7^1 5^1 3^3 1^2, 7^2 5^1 3^1 1^1, 9^1 5^1 3^3, 11^1 1^{12}$
24: $4^6, 6^2 4^3, 6^4, 8^1 4^3 2^2, 8^1 6^2 2^2, 8^3, 10^1 4^2 2^3$
25: $7^1 5^3 3^1, 7^2 3^3 1^2, 7^3 3^1 1^1, 9^1 3^5 1^1, 9^1 5^3 1^1, 9^1 7^1 3^3$
26: $4^6 2^1, 6^2 4^3 2^1, 6^4 2^1, 8^1 6^1 4^3, 8^1 6^3, 8^2 6^1 2^2, 8^3 2^1, 10^1 6^1 4^2 2^1, 12^1 2^7$
27: $7^1 5^3 3^1 1^2, 7^2 3^4 1^1, 7^3 3^2, 9^1 5^3 3^1, 9^1 7^1 3^3 1^2, 9^1 7^2 1^4, 9^3, 11^1 5^2 3^1 3^1, 13^1 1^{14}$
28: $6^2 4^4, 6^4 4^1, 8^1 4^4 2^2, 8^1 6^2 4^1 2^2, 8^2 6^1 4^1 2^1, 8^3 4^1, 10^1 6^1 4^3, 10^1 6^3, 10^1 8^1 2^5, 12^1 4^1 2^6, 12^1 4^4$
29: $7^1 5^4 1^2, 7^3 5^1 3^1, 9^1 5^4, 9^1 7^1 5^1 3^2 1^2, 9^1 7^2 5^1 1^1, 9^2 5^1 3^2, 11^1 3^6, 11^1 5^3 3^1, 11^1 7^1 3^3 1^2$
30: $6^5, 8^1 6^1 4^3 2^2, 8^1 6^3 2^2, 8^2 4^3 2^1, 8^2 6^2 2^1, 8^3 6^1, 10^1 4^5, 10^1 6^2 4^2, 10^1 8^1 4^2 2^2, 10^3, 12^1 6^1 4^3, 12^1 6^3, 14^1 2^8$
31: $5^6 1^1, 7^2 5^3 1^2, 7^4 3^1, 9^1 5^3 3^2 1^1, 9^1 7^1 5^3, 9^1 7^2 3^2 1^2, 9^1 7^3 1^1, 9^2 7^1 3^2, 9^3 3^1 1^1, 11^1 5^2 3^3 1^1, 11^1 7^1 5^2 3^1, 13^1 3^6, 15^1 1^{16}$

32: $6^5 2^1, 8^1 6^2 4^3, 8^1 6^4, 8^2 4^3 2^2, 8^2 6^2 2^2, 8^3 6^1 2^1, 8^4, 10^1 4^5 2^1, 10^1 6^2 4^2 2^1, 10^1 8^1 6^1 4^2, 10^2 6^1 4^1 2^1, 10^3 2^1, 12^1 6^1 4^3 2^1, 12^1 6^3 2^1, 12^1 8^1 4^3, 12^1 8^1 6^1 2^3, 14^1 2^9, 14^1 4^3 2^3$

33: $5^6 3^1, 7^2 5^3 3^1 1^1, 7^4 3^1 1^2, 9^1 7^1 5^3 1^2, 9^1 7^3 3^1, 9^2 5^3, 9^2 7^1 3^2 1^2, 9^2 7^2 1^1, 9^3 3^2, 11^1 7^1 5^2 3^1 1^2, 11^1 9^1 5^2 3^1, 11^3, 13^1 3^6 1^2, 13^1 5^3 3^1 1^2, 13^1 7^1 3^4 1^1, 15^1 3^6$

34: $6^5 4^1, 8^1 6^3 4^1 2^2, 8^2 6^2 4^1 2^1, 8^3 6^1 4^1, 10^1 6^2 4^3, 10^1 6^4, 10^1 8^1 4^3 2^2, 10^1 8^1 6^2 2^2, 10^1 8^2 6^1 2^1, 10^1 8^3, 10^2 6^1 4^2, 10^3 4^1, 12^1 6^1 4^4, 12^1 6^3 4^1, 12^1 8^1 6^1 4^1 2^2, 12^1 8^2 4^1 2^1, 12^1 10^1 4^3, 12^1 10^1 6^1 2^3, 14^1 4^4 2^2, 14^1 6^2 4^1 2^2, 16^1 2^9$

35: $7^1 5^4 3^2 1^2, 7^2 5^4 1^1, 7^4 5^1 1^2, 9^1 5^4 3^2, 9^1 7^2 5^1 3^2 1^1, 9^1 7^3 5^1, 9^2 7^1 5^1 3^1 1^2, 9^3 5^1 3^1, 11^1 7^1 5^3 1^2, 11^1 7^3 3^1, 11^1 9^1 5^3, 11^1 9^1 7^1 3^2 1^2, 11^1 9^1 7^2 1^1, 11^1 9^2 3^2, 11^2 5^2 3^1, 13^1 5^4 1^2, 13^1 7^1 5^1 3^3 1^1, 13^1 7^2 5^1 3^1, 13^1 9^1 5^1 3^2 1^2, 15^1 5^1 3^5, 15^1 5^4, 17^1 1^1 8$

36: $6^6, 8^1 6^4 2^2, 8^2 6^3 2^1, 8^3 6^2, 8^4 2^2, 10^1 6^3 4^2, 10^1 8^1 6^1 4^2 2^2, 10^1 8^2 4^2 2^1, 10^2 4^4, 10^2 6^2 4^1, 10^2 8^1 4^1 2^2, 10^3 6^1, 12^1 6^2 4^3, 12^1 6^4, 12^1 8^1 4^3 2^2, 12^1 8^1 6^2 2^2, 12^1 8^2 6^1 2^1, 12^1 8^3, 12^1 10^1 6^1 4^2, 12^3, 14^1 6^1 4^3 2^2, 14^1 6^3 2^2, 14^1 8^1 4^3 2^1, 14^1 8^1 6^2 2^1, 16^1 4^2 2^6, 16^1 4^5$

37: $7^3 5^3 1^1, 7^5 1^2, 9^1 7^1 5^3 3^2, 9^1 7^3 3^2 1^1, 9^1 7^4, 9^2 5^3 3^1 1^1, 9^2 7^2 3^1 1^2, 9^3 7^1 3^1, 9^4 1^1, 11^1 5^5 1^1, 11^1 7^2 5^2 1^2, 11^1 9^1 5^2 3^2 1^1, 11^1 9^1 7^1 5^2, 11^2 7^1 5^1 3^1, 11^2 9^1 5^1 1^1, 11^3 3^1 1^1, 13^1 7^1 5^3 1^2, 13^1 7^3 3^1, 13^1 9^1 3^5, 13^1 9^1 5^3, 13^1 9^1 7^1 3^2 1^2, 13^1 9^1 7^2 1^1, 13^1 9^2 3^1 1^3, 13^1 11^1 5^2 1^3, 15^1 3^7 1^1, 15^1 5^3 3^2 1^1, 15^1 7^1 3^5, 15^1 7^1 5^3, 15^1 7^2 3^2 1^2$

38: $6^6 2^1, 8^1 6^5, 8^2 6^3 2^2, 8^3 6^2 2^1, 8^4 6^1, 10^1 6^3 4^2 2^1, 10^1 8^1 6^2 4^2, 10^1 8^2 4^2 2^2, 10^2 6^2 4^1 2^1, 10^2 8^1 6^1 4^1, 10^3 6^1 2^1, 10^3 8^1, 12^1 6^4 2^1, 12^1 8^1 6^1 4^3, 12^1 8^1 6^3, 12^1 8^2 6^1 2^2, 12^1 8^3 2^1, 12^1 10^1 6^1 4^2 2^1, 12^1 10^1 8^1 4^2, 12^1 10^2 4^1 2^1, 12^2 6^2 2^1, 12^2 8^1 2^3, 12^3 2^1, 14^1 4^6, 14^1 6^2 4^3, 14^1 6^4, 14^1 8^1 4^3 2^2, 14^1 8^1 6^2 2^2, 14^1 8^2 6^1 2^1, 14^1 8^3, 14^1 10^1 6^1 4^2, 16^1 4^5 2^1, 16^1 6^2 4^2 2^1, 18^1 2^{10}$

39: $7^5 3^1 1^1, 9^1 7^2 5^3 1^1, 9^1 7^4 1^2, 9^2 5^3 3^2, 9^2 7^2 3^2 1^1, 9^2 7^3, 9^3 7^1 3^1 1^2, 9^4 3^1, 11^1 5^5 3^1, 11^1 7^2 5^2 3^1 1^1, 11^1 9^1 7^1 5^2 1^2, 11^1 9^2 5^2, 11^2 7^1 5^1 3^1 1^2, 11^2 9^1 5^1 3^1, 11^3 3^2, 13^1 7^1 5^3 3^1 1^1, 13^1 7^3 3^1 1^2, 13^1 9^1 5^3 1^2, 13^1 9^1 7^2 3^1, 13^1 9^2 3^2 1^2, 13^1 9^2 7^1 1^1, 13^1 11^1 5^2 3^1 1^2, 13^3, 15^1 7^1 5^3 1^2, 15^1 7^2 3^3 1^1, 15^1 7^3 3^1, 15^1 9^1 3^5, 15^1 9^1 5^3, 15^1 9^1 7^1 3^2 1^2, 17^1 5^2 3^4, 19^1 1^{20}$

40: $6^6 4^1, 8^1 6^4 4^1 2^2, 8^2 6^3 4^1 2^1, 8^3 6^2 4^1, 8^4 4^1 2^2, 10^1 6^5, 10^1 8^1 6^3 2^2, 10^1 8^2 6^2 2^1, 10^1 8^3 6^1, 10^2 6^2 4^2, 10^2 8^1 4^2 2^2, 10^3 6^1 4^1, 10^4, 12^1 6^4 4^1, 12^1 8^1 6^2 4^1 2^2, 12^1 8^2 6^1 4^1 2^1, 12^1 8^3 4^1, 12^1 10^1 6^1 4^3, 12^1 10^1 6^3, 12^1 10^1 8^1 6^1 2^2, 12^1 10^1 8^2 2^1, 12^1 10^2 4^2, 12^2 6^2 4^1, 12^2 8^1 4^1 2^2, 12^2 10^1 2^3, 12^3 4^1, 14^1 6^3 4^1 2^2, 14^1 8^1 4^4 2^1, 14^1 8^1 6^2 4^1 2^1, 14^1 8^2 6^1 4^1, 14^1 10^1 4^3 2^2, 14^1 10^1 6^2 2^2, 14^1 10^1 8^1 6^1 2^1, 14^1 12^1 6^1 4^1 2^2, 16^1 4^6, 16^1 6^2 4^3, 16^1 6^4, 16^1 8^1 4^3 2^2, 16^1 8^1 6^2 2^2, 16^1 8^3, 18^1 4^1 2^9, 18^1 4^4 2^3$

41: $7^4 5^1 3^2 1^2, 7^5 5^1 1^1, 9^1 7^3 5^1 3^2, 9^2 7^2 5^1 3^1 1^1, 9^3 7^1 5^1 1^2, 9^4 5^1, 11^1 7^2 5^3 1^1,$
 $11^1 7^4 1^2, 11^1 9^1 5^3 3^2, 11^1 9^1 7^2 3^2 1^1, 11^1 9^1 7^3, 11^1 9^2 7^1 3^1 1^2, 11^1 9^3 3^1,$
 $11^2 7^1 5^2 1^2, 11^2 9^1 5^2, 11^3 5^1 3^1, 13^1 5^4 3^2 1^2, 13^1 7^1 5^4 1^1, 13^1 7^3 5^1 1^2,$
 $13^1 9^1 7^1 5^1 3^2 1^1, 13^1 9^1 7^2 5^1, 13^1 9^2 5^1 3^1 1^2, 13^1 11^1 5^3 1^2, 13^1 11^1 7^2 3^1,$
 $13^1 11^1 9^1 3^2 1^2, 13^1 11^1 9^1 7^1 1^1, 13^2 5^1 3^3 1^1, 13^2 7^1 5^1 3^1, 15^1 5^4 3^2, 15^1 7^2 5^1 3^2 1^1,$
 $15^1 7^3 5^1, 15^1 9^1 7^1 5^1 3^1 1^2, 15^1 9^2 5^1 3^1, 15^1 11^1 3^5, 15^1 11^1 5^3, 15^1 11^1 7^1 3^2 1^2,$
 $17^1 3^8, 17^1 5^3 3^3, 17^1 7^1 3^5 1^2, 17^1 7^1 5^3 1^2, 17^1 7^2 3^3 1^1$

42: $8^1 6^5 2^2, 8^2 6^4 2^1, 8^3 6^3, 8^4 6^1 2^2, 8^5 2^1, 10^1 6^4 4^2, 10^1 8^1 6^2 4^2 2^2,$
 $10^1 8^2 6^1 4^2 2^1, 10^1 8^3 4^2, 10^2 6^3 4^1, 10^2 8^1 6^1 4^1 2^2, 10^2 8^2 4^1 2^1, 10^3 6^2,$
 $10^3 8^1 2^2, 12^1 6^5, 12^1 8^1 6^3 2^2, 12^1 8^2 6^2 2^1, 12^1 8^3 6^1, 12^1 10^1 6^2 4^2,$
 $12^1 10^1 8^1 4^2 2^2, 12^1 10^2 6^1 4^1, 12^1 10^3, 12^2 6^3, 12^2 8^1 6^1 2^2, 12^2 8^2 2^1, 12^2 10^1 4^2,$
 $12^3 6^1, 14^1 6^4 2^2, 14^1 8^1 6^3 2^1, 14^1 8^2 4^3, 14^1 8^2 6^2, 14^1 8^3 2^2, 14^1 10^1 6^1 4^2 2^2,$
 $14^1 10^1 8^1 4^2 2^1, 14^1 10^2 4^1 2^2, 14^1 12^1 4^3 2^2, 14^1 12^1 6^2 2^2, 14^1 12^1 8^1 6^1 2^1, 14^3,$
 $16^1 6^1 4^5, 16^1 6^3 4^2, 16^1 8^1 6^1 4^2 2^2, 16^1 8^2 4^2 2^1, 16^1 10^1 4^4, 16^1 10^1 6^2 4^1,$
 $16^1 10^1 8^1 4^1 2^2, 18^1 4^6, 18^1 6^2 4^3, 18^1 6^4, 20^1 2^{11}$

43: $7^5 3^2 1^2, 7^6 1^1, 9^1 7^4 3^2, 9^2 7^3 3^1 1^1, 9^3 7^2 1^2, 9^4 3^2 1^1, 9^4 7^1, 11^1 7^2 5^2 3^2 1^2,$
 $11^1 7^3 5^2 1^1, 11^1 9^1 7^1 5^2 3^2, 11^1 9^2 5^2 3^1 1^1, 11^2 5^4 1^1, 11^2 7^2 5^1 1^2, 11^2 9^1 5^1 3^2 1^1,$
 $11^2 9^1 7^1 5^1, 11^3 7^1 3^1, 11^3 9^1 1^1, 13^1 7^2 5^3 1^1, 13^1 7^4 1^2, 13^1 9^1 5^3 3^2, 13^1 9^1 7^2 3^2 1^1,$
 $13^1 9^1 7^3, 13^1 9^2 7^1 3^1 1^2, 13^1 9^3 3^1, 13^1 11^1 7^1 5^2 1^2, 13^1 11^1 9^1 5^2, 13^1 11^2 5^1 3^1,$
 $13^2 5^3 1^2, 13^2 7^1 3^3 1^1, 13^2 7^2 3^1, 13^2 9^1 3^2 1^2, 13^3 3^1 1^1, 15^1 7^1 5^3 3^2, 15^1 7^3 3^2 1^1,$
 $15^1 7^4, 15^1 9^1 5^3 3^1 1^1, 15^1 9^1 7^2 3^1 1^2, 15^1 9^2 7^1 3^1, 15^1 9^3 1^1, 15^1 11^1 5^2 3^2 1^1,$
 $15^1 11^1 7^1 5^2, 15^1 13^1 3^5, 15^1 13^1 5^3, 15^1 13^1 7^1 3^2 1^2, 17^1 5^5 1^1, 17^1 7^1 5^2 3^3,$
 $17^1 7^2 5^2 1^2, 17^1 9^1 5^2 3^2 1^1, 19^1 3^8, 19^1 5^3 3^3, 21^1 2^{22}$

44: $8^2 6^4 2^2, 8^3 6^3 2^1, 8^4 6^2, 8^5 2^2, 10^1 6^4 4^2 2^1, 10^1 8^1 6^3 4^2, 10^1 8^2 6^1 4^2 2^2,$
 $10^1 8^3 4^2 2^1, 10^2 6^3 4^1 2^1, 10^2 8^1 6^2 4^1, 10^2 8^2 4^1 2^2, 10^3 6^2 2^1, 10^3 8^1 6^1, 12^1 6^5 2^1,$
 $12^1 8^1 6^4, 12^1 8^2 6^2 2^2, 12^1 8^3 6^1 2^1, 12^1 8^4, 12^1 10^1 6^2 4^2 2^1, 12^1 10^1 8^1 6^1 4^2,$
 $12^1 10^2 6^1 4^1 2^1, 12^1 10^2 8^1 4^1, 12^1 10^3 2^1, 12^2 6^3 2^1, 12^2 8^1 6^2, 12^2 8^2 2^2,$
 $12^2 10^1 4^2 2^1, 12^3 6^1 2^1, 12^3 8^1, 14^1 6^5, 14^1 8^1 6^3 2^2, 14^1 8^2 6^2 2^1, 14^1 8^3 6^1,$
 $14^1 10^1 6^2 4^2, 14^1 10^1 8^1 4^2 2^2, 14^1 10^2 6^1 4^1, 14^1 10^3, 14^1 12^1 6^1 4^3, 14^1 12^1 6^3,$
 $14^1 12^1 8^1 6^1 2^2, 14^1 12^1 8^2 2^1, 14^1 12^1 10^1 4^2, 14^1 12^2 2^3, 14^2 6^2 2^2, 14^2 8^1 2^4,$
 $14^3 2^1, 16^1 6^3 4^2 2^1, 16^1 8^1 6^2 4^2, 16^1 8^2 4^2 2^2, 16^1 10^1 4^4 2^1, 16^1 10^1 6^2 4^1 2^1,$
 $16^1 10^1 8^1 6^1 4^1, 16^1 10^2 2^4, 16^1 12^1 6^1 4^2 2^1, 16^1 12^1 8^1 4^2, 18^1 4^6 2^1, 18^1 6^2 4^3 2^1,$
 $18^1 6^4 2^1, 18^1 8^1 6^1 4^3, 18^1 8^1 6^3, 18^1 8^2 2^5, 20^1 2^{12}, 20^1 4^3 2^6, 20^1 4^6$

45: $7^6 3^1, 9^1 7^4 3^2 1^2, 9^1 7^5 1^1, 9^2 7^3 3^2, 9^3 7^2 3^1 1^1, 9^4 7^1 1^2, 9^5, 11^1 7^3 5^2 3^1,$
 $11^1 9^1 7^1 5^2 3^2 1^2, 11^1 9^1 7^2 5^2 1^1, 11^1 9^2 5^2 3^2, 11^2 7^2 5^1 3^1 1^1, 11^2 9^1 7^1 5^1 1^2,$
 $11^2 9^2 5^1, 11^3 7^1 3^1 1^2, 11^3 9^1 3^1, 13^1 7^4 3^1 1^1, 13^1 9^1 7^1 5^3 1^1, 13^1 9^1 7^3 1^2,$
 $13^1 9^2 7^1 3^2 1^1, 13^1 9^2 7^2, 13^1 9^3 3^1 1^2, 13^1 11^1 7^1 5^2 3^1 1^1, 13^1 11^1 9^1 5^2 1^2,$
 $13^1 11^2 5^1 3^1 1^2, 13^2 5^3 3^1 1^1, 13^2 7^2 3^1 1^2, 13^2 9^1 7^1 3^1, 13^2 9^2 1^1, 13^3 3^2,$
 $15^1 7^1 5^3 3^2 1^2, 15^1 7^2 5^3 1^1, 15^1 7^4 1^2, 15^1 9^1 5^3 3^2, 15^1 9^1 7^2 3^2 1^1, 15^1 9^1 7^3,$
 $15^1 9^2 7^1 3^1 1^2, 15^1 9^3 3^1, 15^1 11^1 7^1 5^2 1^2, 15^1 11^1 9^1 5^2, 15^1 11^2 5^1 3^1, 15^1 13^1 5^3 1^2,$
 $15^1 13^1 7^1 3^3 1^1, 15^1 13^1 7^2 3^1, 15^1 13^1 9^1 3^2 1^2, 15^3, 17^1 5^5 3^1, 17^1 7^2 5^2 3^1 1^1,$

$17^1 9^1 7^1 5^2 1^2, 17^1 9^2 5^2, 17^1 11^1 5^1 3^4, 17^1 11^1 7^1 5^1 3^1 1^2, 19^1 3^8 1^2, 19^1 5^3 3^3 1^2,$
 $19^1 7^1 3^6 1^1, 19^1 7^1 5^3 3^1 1^1, 19^1 7^2 3^4, 21^1 3^8$

46: $8^4 6^1 4^1 2^2, 8^5 4^1 2^1, 10^1 8^3 6^2, 10^1 8^4 2^2, 10^2 6^3 4^2, 10^2 8^1 6^1 4^2 2^2,$
 $10^2 8^2 4^2 2^1, 10^3 6^2 4^1, 10^3 8^1 4^1 2^2, 10^4 6^1, 12^1 6^5 4^1, 12^1 8^1 6^3 4^1 2^2,$
 $12^1 8^2 6^2 4^1 2^1, 12^1 8^3 6^1 4^1, 12^1 10^1 6^4, 12^1 10^1 8^1 6^2 2^2, 12^1 10^1 8^2 6^1 2^1,$
 $12^1 10^1 8^3, 12^1 10^2 6^1 4^2, 12^1 10^3 4^1, 12^2 6^3 4^1, 12^2 8^1 6^1 4^1 2^2, 12^2 8^2 4^1 2^1,$
 $12^2 10^1 6^2, 12^2 10^1 8^1 2^2, 12^3 6^1 4^1, 12^3 10^1, 14^1 6^4 4^1 2^2, 14^1 8^1 6^3 4^1 2^1,$
 $14^1 8^2 6^2 4^1, 14^1 8^3 4^1 2^2, 14^1 10^1 6^3 2^2, 14^1 10^1 8^1 6^2 2^1, 14^1 10^1 8^2 6^1,$
 $14^1 10^2 4^2 2^2, 14^1 12^1 6^2 4^1 2^2, 14^1 12^1 8^1 6^1 4^1 2^1, 14^1 12^1 8^2 4^1, 14^1 12^1 10^1 6^1 2^2,$
 $14^1 12^1 10^1 8^1 2^1, 14^1 12^2 4^1 2^2, 14^2 6^2 4^1 2^1, 14^2 8^1 6^1 4^1, 14^2 10^1 6^1 2^1,$
 $14^2 12^1 4^1 2^1, 14^3 4^1, 16^1 6^5, 16^1 8^1 6^3 2^2, 16^1 8^2 6^2 2^1, 16^1 8^3 6^1, 16^1 10^1 6^2 4^2,$
 $16^1 10^1 8^1 4^2 2^2, 16^1 10^2 6^1 4^1, 16^1 10^3, 16^1 12^1 6^1 4^3, 16^1 12^1 6^3, 16^1 12^1 8^1 6^1 2^2,$
 $16^1 12^1 8^2 2^1, 16^1 12^1 10^1 4^2, 16^1 14^1 4^3 2^2, 16^1 14^1 6^2 2^2, 16^1 14^1 8^1 2^4, 18^1 4^7,$
 $18^1 6^2 4^4, 18^1 6^4 4^1, 18^1 8^1 4^4 2^2, 18^1 8^1 6^2 4^1 2^2, 18^1 8^2 6^1 4^1 2^1, 18^1 8^3 4^1,$
 $18^1 10^1 6^1 4^3, 18^1 10^1 6^3, 18^1 10^1 8^1 6^1 2^2, 18^1 10^1 8^2 2^1, 20^1 6^1 4^4 2^2, 20^1 6^3 4^1 2^2,$
 $22^1 2^{12}$

47: $7^5 5^1 3^2 1^1, 7^6 5^1, 9^1 7^4 5^1 3^1 1^2, 9^2 7^3 5^1 3^1, 9^3 7^1 5^1 3^2 1^2, 9^3 7^2 5^1 1^1,$
 $9^4 5^1 3^2, 11^1 7^4 3^2 1^2, 11^1 7^5 1^1, 11^1 9^1 7^3 3^2, 11^1 9^2 7^2 3^1 1^1, 11^1 9^3 7^1 1^2, 11^1 9^4,$
 $11^2 7^1 5^2 3^2 1^2, 11^2 7^2 5^2 1^1, 11^2 9^1 5^2 3^2, 11^3 7^1 5^1 1^2, 11^3 9^1 5^1, 11^4 3^1,$
 $13^1 7^3 5^1 3^2 1^2, 13^1 7^4 5^1 1^1, 13^1 9^1 7^2 5^1 3^2, 13^1 9^2 7^1 5^1 3^1 1^1, 13^1 9^3 5^1 1^2,$
 $13^1 11^1 7^1 5^3 1^1, 13^1 11^1 7^3 1^2, 13^1 11^1 9^1 7^1 3^2 1^1, 13^1 11^1 9^1 7^2, 13^1 11^1 9^2 3^1 1^2,$
 $13^1 11^2 5^2 1^2, 13^2 5^4 1^1, 13^2 7^2 5^1 1^2, 13^2 9^1 5^1 3^2 1^1, 13^2 9^1 7^1 5^1, 13^2 11^1 7^1 3^1,$
 $13^2 11^1 9^1 1^1, 13^3 5^1 3^1, 15^1 7^3 5^1 3^2, 15^1 9^1 5^4 3^1, 15^1 9^1 7^2 5^1 3^1 1^1, 15^1 9^2 7^1 5^1 1^2,$
 $15^1 9^3 5^1, 15^1 11^1 5^3 3^2, 15^1 11^1 7^2 3^2 1^1, 15^1 11^1 7^3, 15^1 11^1 9^1 7^1 3^1 1^2,$
 $15^1 11^1 9^2 3^1, 15^1 11^2 5^2, 15^1 13^1 7^1 5^1 3^2 1^1, 15^1 13^1 7^2 5^1, 15^1 13^1 9^1 5^1 3^1 1^2,$
 $15^1 13^1 11^1 3^2 1^2, 15^2 5^1 3^4, 15^2 7^1 5^1 3^1 1^2, 17^1 5^6, 17^1 7^1 5^3 3^2 1^2, 17^1 7^2 5^3 1^1,$
 $17^1 7^4 1^2, 17^1 9^1 5^3 3^2, 17^1 9^1 7^2 3^2 1^1, 17^1 9^1 7^3, 17^1 9^2 7^1 3^1 1^2, 17^1 9^3 3^1,$
 $17^1 11^1 7^1 5^2 1^2, 17^1 11^1 9^1 5^2, 17^1 13^1 3^5 1^2, 17^1 13^1 5^3 1^2, 17^1 13^1 7^1 3^3 1^1,$
 $19^1 5^4 3^2 1^2, 19^1 7^1 5^4 1^1, 19^1 7^2 5^1 3^3, 19^1 7^3 5^1 1^2, 19^1 9^1 5^1 3^4 1^2,$
 $19^1 9^1 7^1 5^1 3^2 1^1, 19^1 9^2 5^1 1^5, 21^1 5^1 3^7, 21^1 5^4 3^1 1^3, 23^1 1^{24}$

48: $8^4 6^2 2^2, 8^5 6^1 2^1, 8^6, 10^1 8^2 6^2 4^2 2^1, 10^1 8^3 6^1 4^2, 10^2 8^1 6^2 4^1 2^2,$
 $10^2 8^2 6^1 4^1 2^1, 10^2 8^3 4^1, 10^3 8^1 6^1 2^2, 10^3 8^2 2^1, 10^4 4^2, 12^1 8^2 6^3 2^1, 12^1 8^3 6^2,$
 $12^1 8^4 2^2, 12^1 10^1 6^3 4^2, 12^1 10^1 8^1 6^1 4^2 2^2, 12^1 10^1 8^2 4^2 2^1, 12^1 10^2 6^2 4^1,$
 $12^1 10^2 8^1 4^1 2^2, 12^1 10^3 6^1, 12^2 6^4, 12^2 8^1 6^2 2^2, 12^2 8^2 6^1 2^1, 12^2 8^3,$
 $12^2 10^1 6^1 4^2, 12^2 10^2 4^1, 12^3 6^2, 12^3 8^1 2^2, 12^4, 14^1 6^5 2^2, 14^1 8^1 6^4 2^1, 14^1 8^2 6^3,$
 $14^1 8^3 6^1 2^2, 14^1 8^4 2^1, 14^1 10^1 6^2 4^2 2^2, 14^1 10^1 8^1 6^1 4^2 2^1, 14^1 10^1 8^2 4^2,$
 $14^1 10^2 6^1 4^1 2^2, 14^1 10^2 8^1 4^1 2^1, 14^1 10^3 2^2, 14^1 12^1 6^3 2^2, 14^1 12^1 8^1 6^2 2^1,$
 $14^1 12^1 8^2 6^1, 14^1 12^1 10^1 4^2 2^2, 14^1 12^2 6^1 2^2, 14^1 12^2 8^1 2^1, 14^2 6^3 2^1, 14^2 8^1 4^3,$
 $14^2 8^1 6^2, 14^2 8^2 2^2, 14^2 10^1 4^2 2^1, 14^2 12^1 6^1 2^1, 14^3 6^1, 16^1 6^4 4^2,$
 $16^1 8^1 6^2 4^2 2^2, 16^1 8^2 6^1 4^2 2^1, 16^1 8^3 4^2, 16^1 10^1 6^3 4^1, 16^1 10^1 8^1 6^1 4^1 2^2,$
 $16^1 10^1 8^2 4^1 2^1, 16^1 10^2 4^3, 16^1 10^2 6^2, 16^1 10^2 8^1 2^2, 16^1 12^1 6^2 4^2,$

$16^1 12^1 8^1 4^2 2^2, 16^1 12^1 10^1 6^1 4^1, 16^1 12^2 4^2, 16^1 14^1 6^1 4^2 2^2, 16^1 14^1 8^1 4^2 2^1,$
 $16^1 14^1 10^1 4^1 2^2, 16^3, 18^1 6^5, 18^1 8^1 6^3 2^2, 18^1 8^2 4^3 2^1, 18^1 8^2 6^2 2^1, 18^1 8^3 6^1,$
 $18^1 10^1 4^5, 18^1 10^1 6^2 4^2, 18^1 10^1 8^1 4^2 2^2, 18^1 10^2 6^1 4^1, 18^1 10^3, 18^1 12^1 6^1 4^3,$
 $18^1 12^1 6^3, 18^1 12^1 8^1 6^1 2^2, 20^1 4^6 2^2, 20^1 6^2 4^3 2^2, 20^1 6^4 2^2, 20^1 8^1 6^1 4^3 2^1,$
 $20^1 8^1 6^3 2^1, 20^1 8^2 4^3, 20^1 8^2 6^1 2^3, 22^1 4^2 2^9, 22^1 4^5 2^3$

49: $7^6 3^2 1^1, 9^1 7^5 3^1 1^2, 9^2 7^4 3^1, 9^3 7^2 3^2 1^2, 9^3 7^3 1^1, 9^4 7^1 3^2, 9^5 3^1 1^1,$
 $11^1 7^3 5^2 3^2 1^1, 11^1 7^4 5^2, 11^1 9^1 7^2 5^2 3^1 1^2, 11^1 9^2 7^1 5^2 3^1, 11^1 9^3 5^2 1^1,$
 $11^2 7^2 5^1 3^2 1^2, 11^2 7^3 5^1 1^1, 11^2 9^1 7^1 5^1 3^2, 11^2 9^2 5^1 3^1 1^1, 11^3 7^2 1^2, 11^3 9^1 3^2 1^1,$
 $11^3 9^1 7^1, 13^1 7^4 3^2 1^2, 13^1 7^5 1^1, 13^1 9^1 7^3 3^2, 13^1 9^2 7^2 3^1 1^1, 13^1 9^3 7^1 1^2, 13^1 9^4,$
 $13^1 11^1 7^1 5^2 3^2 1^2, 13^1 11^1 7^2 5^2 1^1, 13^1 11^1 9^1 5^2 3^2, 13^1 11^2 7^1 5^1 1^2, 13^1 11^2 9^1 5^1,$
 $13^1 11^3 1^1, 13^2 7^1 5^3 1^1, 13^2 7^3 1^2, 13^2 9^1 7^1 3^2 1^1, 13^2 9^1 7^2, 13^2 9^2 3^1 1^2,$
 $13^2 11^1 5^2 1^2, 13^3 7^1 3^1, 13^3 9^1 1^1, 15^1 7^4 3^2, 15^1 9^1 7^3 3^1 1^1, 15^1 9^2 5^3 1^1,$
 $15^1 9^2 7^2 1^2, 15^1 9^3 3^2 1^1, 15^1 9^3 7^1, 15^1 11^1 7^1 5^2 3^2, 15^1 11^1 9^1 5^2 3^1 1^1,$
 $15^1 11^2 5^1 3^2 1^1, 15^1 11^2 7^1 5^1, 15^1 11^3 1^1, 15^1 13^1 7^2 3^2 1^1, 15^1 13^1 7^3,$
 $15^1 13^1 9^1 7^1 3^1 1^2, 15^1 13^1 9^2 3^1, 15^1 13^1 11^1 5^2, 15^1 13^2 3^2 1^2, 15^2 7^2 3^1 1^2,$
 $15^2 9^1 3^3 1^1, 15^2 9^1 7^1 3^1, 15^2 13^1 3^2, 15^3 3^1 1^1, 17^1 7^1 5^5, 17^1 7^2 5^2 3^2 1^2,$
 $17^1 7^3 5^2 1^1, 17^1 9^1 7^1 5^2 3^2, 17^1 9^2 5^2 3^1 1^1, 17^1 11^1 5^4 1^1, 17^1 11^1 7^2 5^1 1^2,$
 $17^1 11^1 9^1 5^1 3^2 1^1, 17^1 11^1 9^1 7^1 5^1, 17^1 11^2 3^3 1^1, 17^1 11^2 7^1 3^1, 17^1 13^1 7^1 5^2 1^2,$
 $17^1 13^1 9^1 5^2, 17^1 15^1 5^2 3^2 1^1, 19^1 5^6, 19^1 7^1 5^3 3^2 1^2, 19^1 7^2 5^3 1^1, 19^1 7^4 1^2,$
 $19^1 9^1 5^3 3^2, 19^1 9^1 7^2 3^2 1^1, 19^1 9^1 7^3, 19^1 9^2 7^1 3^1 1^2, 19^1 9^3 3^1, 19^1 11^1 5^2 3^3,$
 $19^1 11^1 7^1 5^2 1^2, 21^1 3^9 1^1, 21^1 5^3 3^4 1^1, 21^1 7^1 3^7, 21^1 7^1 5^3 3^2, 21^1 7^2 3^4 1^2, 21^1 7^4$

50: $8^5 6^1 2^2, 8^6 2^1, 10^1 8^2 6^2 4^2 2^2, 10^1 8^3 6^1 4^2 2^1, 10^1 8^4 4^2, 10^2 8^2 6^1 4^1 2^2,$
 $10^2 8^3 4^1 2^1, 10^3 8^1 6^2, 10^3 8^2 2^2, 10^4 4^2 2^1, 12^1 8^3 6^2 2^1, 12^1 8^4 6^1,$
 $12^1 10^1 8^1 6^2 4^2, 12^1 10^1 8^2 4^2 2^2, 12^1 10^2 6^2 4^1 2^1, 12^1 10^2 8^1 6^1 4^1, 12^1 10^3 6^1 2^1,$
 $12^1 10^3 8^1, 12^2 6^4 2^1, 12^2 8^1 6^3, 12^2 8^2 6^1 2^2, 12^2 8^3 2^1, 12^2 10^1 6^1 4^2 2^1,$
 $12^2 10^1 8^1 4^2, 12^2 10^2 4^1 2^1, 12^3 6^2 2^1, 12^3 8^1 6^1, 12^4 2^1, 14^1 8^2 6^3 2^1, 14^1 8^3 6^2,$
 $14^1 8^4 2^2, 14^1 10^1 6^3 4^2, 14^1 10^1 8^1 6^1 4^2 2^2, 14^1 10^1 8^2 4^2 2^1, 14^1 10^2 6^2 4^1,$
 $14^1 10^2 8^1 4^1 2^2, 14^1 10^3 6^1, 14^1 12^1 6^4, 14^1 12^1 8^1 6^2 2^2, 14^1 12^1 8^2 6^1 2^1,$
 $14^1 12^1 8^3, 14^1 12^1 10^1 6^1 4^2, 14^1 12^1 10^2 4^1, 14^1 12^2 6^2, 14^1 12^2 8^1 2^2, 14^1 12^3,$
 $14^2 6^3 2^2, 14^2 8^1 6^2 2^1, 14^2 8^2 6^1, 14^2 10^1 4^2 2^2, 14^2 12^1 6^1 2^2, 14^2 12^1 8^1 2^1,$
 $14^3 6^1 2^1, 14^3 8^1, 16^1 6^4 4^2 2^1, 16^1 8^1 6^3 4^2, 16^1 8^2 6^1 4^2 2^2, 16^1 8^3 4^2 2^1,$
 $16^1 10^1 6^3 4^1 2^1, 16^1 10^1 8^1 6^2 4^1, 16^1 10^1 8^2 4^1 2^2, 16^1 10^2 6^2 2^1, 16^1 10^2 8^1 6^1,$
 $16^1 12^1 6^2 4^2 2^1, 16^1 12^1 8^1 6^1 4^2, 16^1 12^1 10^1 6^1 4^1 2^1, 16^1 12^1 10^1 8^1 4^1,$
 $16^1 12^1 10^2 2^1, 16^1 12^2 4^2 2^1, 16^1 14^1 6^2 4^2, 16^1 14^1 8^1 4^2 2^2, 16^1 14^1 10^1 6^1 4^1,$
 $16^1 14^1 12^1 4^2, 16^2 6^2 4^1 2^1, 16^2 8^1 6^1 4^1, 16^2 10^1 2^4, 16^3 2^1, 18^1 6^5 2^1, 18^1 8^1 6^4,$
 $18^1 8^2 6^2 2^2, 18^1 8^3 6^1 2^1, 18^1 8^4, 18^1 10^1 6^2 4^2 2^1, 18^1 10^1 8^1 6^1 4^2,$
 $18^1 10^2 6^1 4^1 2^1, 18^1 10^2 8^1 4^1, 18^1 10^3 2^1, 18^1 12^1 6^1 4^3 2^1, 18^1 12^1 6^3 2^1,$
 $18^1 12^1 8^1 4^3, 18^1 12^1 8^1 6^2, 18^1 12^1 8^2 2^2, 18^1 12^1 10^1 4^2 2^1, 18^1 12^2 2^4,$
 $18^1 14^1 6^1 4^3, 18^1 14^1 6^3, 18^1 14^1 8^1 6^1 2^2, 20^1 6^1 4^6, 20^1 6^3 4^3, 20^1 6^5,$
 $20^1 8^1 6^1 4^3 2^2, 20^1 8^1 6^3 2^2, 20^1 8^2 4^3 2^1, 20^1 8^2 6^2 2^1, 20^1 8^3 6^1, 20^1 10^1 4^5,$
 $20^1 10^1 6^2 4^2, 20^1 10^1 8^1 4^2 2^2, 20^1 10^3, 22^1 6^1 4^5 2^1, 22^1 6^3 4^2 2^1, 24^1 2^1 3$

51: $9^2 7^4 3^1 1^2, 9^3 7^3 3^1, 9^4 7^1 3^2 1^2, 9^4 7^2 1^1, 9^5 3^2, 11^1 7^4 5^2 1^2,$

$11^1 9^1 7^2 5^2 3^2 1^1, 11^1 9^1 7^3 5^2, 11^1 9^2 7^1 5^2 3^1 1^2, 11^1 9^3 5^2 3^1, 11^2 7^3 5^1 3^1,$
 $11^2 9^1 7^1 5^1 3^2 1^2, 11^2 9^1 7^2 5^1 1^1, 11^2 9^2 5^1 3^2, 11^3 7^2 3^1 1^1, 11^3 9^1 7^1 1^2, 11^3 9^2,$
 $13^1 7^5 3^1, 13^1 9^1 7^3 3^2 1^2, 13^1 9^1 7^4 1^1, 13^1 9^2 7^2 3^2, 13^1 9^3 7^1 3^1 1^1, 13^1 9^4 1^2,$
 $13^1 11^1 7^2 5^2 3^1, 13^1 11^1 9^1 5^2 3^2 1^2, 13^1 11^1 9^1 7^1 5^2 1^1, 13^1 11^2 7^1 5^1 3^1 1^1,$
 $13^1 11^2 9^1 5^1 1^2, 13^1 11^3 3^1 1^2, 13^2 7^3 3^1 1^1, 13^2 9^1 7^2 1^2, 13^2 9^2 3^2 1^1, 13^2 9^2 7^1,$
 $13^2 11^1 5^2 3^1 1^1, 13^3 7^1 3^1 1^2, 13^3 9^1 3^1, 15^1 7^4 3^2 1^2, 15^1 7^5 1^1, 15^1 9^1 7^3 3^2,$
 $15^1 9^2 7^2 3^1 1^1, 15^1 9^3 7^1 1^2, 15^1 9^4, 15^1 11^1 7^1 5^2 3^2 1^2, 15^1 11^1 7^2 5^2 1^1,$
 $15^1 11^1 9^1 5^2 3^2, 15^1 11^2 7^1 5^1 1^2, 15^1 11^2 9^1 5^1, 15^1 11^3 3^1, 15^1 13^1 7^3 1^2,$
 $15^1 13^1 9^1 7^1 3^2 1^1, 15^1 13^1 9^1 7^2, 15^1 13^1 9^2 3^1 1^2, 15^1 13^1 11^1 5^2 1^2, 15^1 13^2 7^1 3^1,$
 $15^1 13^2 9^1 1^1, 15^2 7^2 3^2 1^1, 15^2 7^3, 15^2 9^1 7^1 3^1 1^2, 15^2 9^2 3^1, 15^2 11^1 5^2,$
 $15^2 13^1 3^2 1^2, 15^2 13^1 7^1 1^1, 15^3 3^2, 17^1 7^3 5^2 3^1, 17^1 9^1 7^1 5^2 3^2 1^2, 17^1 9^1 7^2 5^2 1^1,$
 $17^1 9^2 5^2 3^2, 17^1 11^1 5^4 3^1, 17^1 11^1 7^2 5^1 3^1 1^1, 17^1 11^1 9^1 7^1 5^1 1^2, 17^1 11^1 9^2 5^1,$
 $17^1 11^2 7^1 3^1 1^2, 17^1 11^2 9^1 3^1, 17^1 13^1 7^1 5^2 3^1 1^1, 17^1 13^1 9^1 5^2 1^2,$
 $17^1 13^1 11^1 5^1 3^1 1^2, 17^1 15^1 7^1 5^2 1^2, 17^1 15^1 9^1 5^2, 17^3, 19^1 5^6 1^2, 19^1 7^2 5^3 3^1,$
 $19^1 7^4 3^1 1^1, 19^1 9^1 5^3 3^2 1^2, 19^1 9^1 7^1 5^3 1^1, 19^1 9^1 7^3 1^2, 19^1 9^2 7^1 3^2 1^1, 19^1 9^2 7^2,$
 $19^1 9^3 3^1 1^2, 19^1 11^1 7^1 5^2 3^1 1^1, 19^1 11^1 9^1 5^2 1^2, 19^1 11^2 5^1 3^1 1^2, 19^1 13^1 5^3 3^1 1^1,$
 $19^1 13^1 7^1 3^4, 19^1 13^1 7^2 3^1 1^2, 19^1 13^1 9^1 3^3 1^1, 21^1 5^6, 21^1 7^1 5^3 3^2 1^2, 21^1 7^2 5^3 1^1,$
 $21^1 7^4 1^2, 21^1 9^1 5^3 3^2, 21^1 9^1 7^1 3^4 1^2, 21^1 9^1 7^2 3^2 1^1, 21^1 9^1 7^3, 21^1 9^2 3^4,$
 $23^1 5^2 3^6, 25^1 1^{26}$

52: $8^4 6^2 4^1 2^2, 8^5 6^1 4^1 2^1, 8^6 4^1, 10^1 8^4 6^1 2^2, 10^1 8^5 2^1, 10^2 8^1 6^2 4^2 2^2,$
 $10^2 8^2 6^1 4^2 2^1, 10^2 8^3 4^2, 10^3 8^1 6^1 4^1 2^2, 10^3 8^2 4^1 2^1, 10^4 6^2, 10^4 8^1 2^2,$
 $12^1 8^3 6^2 4^1, 12^1 8^4 4^1 2^2, 12^1 10^1 8^2 6^2 2^1, 12^1 10^1 8^3 6^1, 12^1 10^2 6^2 4^2,$
 $12^1 10^2 8^1 4^2 2^2, 12^1 10^3 6^1 4^1, 12^1 10^4, 12^2 8^1 6^2 4^1 2^2, 12^2 8^2 6^1 4^1 2^1, 12^2 8^3 4^1,$
 $12^2 10^1 6^3, 12^2 10^1 8^1 6^1 2^2, 12^2 10^1 8^2 2^1, 12^2 10^2 4^2, 12^3 6^2 4^1, 12^3 8^1 4^1 2^2,$
 $12^3 10^1 6^1, 12^4 4^1, 14^1 8^3 6^1 4^1 2^2, 14^1 8^4 4^1 2^1, 14^1 10^1 8^1 6^3 2^1, 14^1 10^1 8^2 6^2,$
 $14^1 10^1 8^3 2^2, 14^1 10^2 6^1 4^2 2^2, 14^1 10^2 8^1 4^2 2^1, 14^1 10^3 4^1 2^2, 14^1 12^1 6^3 4^1 2^2,$
 $14^1 12^1 8^1 6^2 4^1 2^1, 14^1 12^1 8^2 6^1 4^1, 14^1 12^1 10^1 6^2 2^2, 14^1 12^1 10^1 8^1 6^1 2^1,$
 $14^1 12^1 10^1 8^2, 14^1 12^2 6^1 4^1 2^2, 14^1 12^2 8^1 4^1 2^1, 14^1 12^2 10^1 2^2, 14^2 6^3 4^1 2^1,$
 $14^2 8^1 6^2 4^1, 14^2 8^2 4^1 2^2, 14^2 10^1 6^2 2^1, 14^2 10^1 8^1 6^1, 14^2 12^1 6^1 4^1 2^1,$
 $14^2 12^1 8^1 4^1, 14^2 12^1 10^1 2^1, 14^3 6^1 4^1, 14^3 10^1, 16^1 8^1 6^4 2^2, 16^1 8^2 6^3 2^1,$
 $16^1 8^3 6^2, 16^1 8^4 2^2, 16^1 10^1 6^3 4^2, 16^1 10^1 8^1 6^1 4^2 2^2, 16^1 10^1 8^2 4^2 2^1,$
 $16^1 10^2 6^2 4^1, 16^1 10^2 8^1 4^1 2^2, 16^1 10^3 6^1, 16^1 12^1 6^4, 16^1 12^1 8^1 6^2 2^2,$
 $16^1 12^1 8^2 6^1 2^1, 16^1 12^1 8^3, 16^1 12^1 10^1 6^1 4^2, 16^1 12^1 10^2 4^1, 16^1 12^2 6^2,$
 $16^1 12^2 8^1 2^2, 16^1 12^3, 16^1 14^1 6^3 2^2, 16^1 14^1 8^1 6^2 2^1, 16^1 14^1 8^2 6^1,$
 $16^1 14^1 10^1 4^2 2^2, 16^1 14^1 12^1 6^1 2^2, 16^1 14^1 12^1 8^1 2^1, 16^1 14^2 6^1 2^1, 16^2 6^2 4^2,$
 $16^2 8^1 4^2 2^2, 16^2 10^1 6^1 4^1, 16^2 12^1 4^2, 16^3 4^1, 18^1 6^5 4^1, 18^1 8^1 6^3 4^1 2^2,$
 $18^1 8^2 6^2 4^1 2^1, 18^1 8^3 6^1 4^1, 18^1 10^1 6^4, 18^1 10^1 8^1 6^2 2^2, 18^1 10^1 8^2 6^1 2^1,$
 $18^1 10^1 8^3, 18^1 10^2 6^1 4^2, 18^1 10^3 4^1, 18^1 12^1 6^3 4^1, 18^1 12^1 8^1 6^1 4^1 2^2,$
 $18^1 12^1 8^2 4^1 2^1, 18^1 12^1 10^1 4^3, 18^1 12^1 10^1 6^2, 18^1 12^1 10^1 8^1 2^2, 18^1 12^2 6^1 4^1,$
 $18^1 14^1 4^4 2^2, 18^1 14^1 6^2 4^1 2^2, 18^1 14^1 8^1 6^1 4^1 2^1, 18^1 14^1 8^2 4^1, 18^1 14^1 10^1 6^1 2^2,$
 $18^1 16^1 6^1 4^3, 18^1 16^1 6^3, 18^1 16^1 8^1 2^5, 20^1 6^4 4^1 2^2, 20^1 8^1 6^3 4^1 2^1, 20^1 8^2 6^2 4^1,$
 $20^1 8^3 4^1 2^2, 20^1 10^1 6^1 4^3 2^2, 20^1 10^1 6^3 2^2, 20^1 10^1 8^1 4^3 2^1, 20^1 10^1 8^1 6^2 2^1,$

$20^1 10^1 8^2 6^1$, $20^1 10^2 4^2 2^2$, $20^1 12^1 4^4 2^2$, $20^1 12^1 6^2 4^1 2^2$, $20^1 12^1 8^1 6^1 4^1 2^1$,
 $20^1 12^1 8^2 4^1$, $20^1 12^1 10^1 2^5$, $22^1 6^1 4^6$, $22^1 6^3 4^3$, $22^1 6^5$, $22^1 8^1 6^1 4^3 2^2$,
 $22^1 8^1 6^3 2^2$, $22^1 8^2 4^3 2^1$, $22^1 8^2 6^2 2^1$, $24^1 4^1 2^{12}$, $24^1 4^4 2^6$, $24^1 4^7$

53: $9^3 7^2 5^1 3^2 1^1$, $9^3 7^3 5^1$, $9^4 7^1 5^1 3^1 1^2$, $9^5 5^1 3^1$, $11^1 9^2 7^3 3^1$, $11^1 9^3 7^1 3^2 1^2$,
 $11^1 9^3 7^2 1^1$, $11^1 9^4 3^2$, $11^2 7^2 5^2 3^2 1^1$, $11^2 7^3 5^2$, $11^2 9^1 7^1 5^2 3^1 1^2$, $11^2 9^2 5^2 3^1$,
 $11^3 7^1 5^1 3^2 1^2$, $11^3 7^2 5^1 1^1$, $11^3 9^1 5^1 3^2$, $11^4 7^1 1^2$, $11^4 9^1$, $13^1 7^4 5^1 3^2 1^1$, $13^1 7^5 5^1$,
 $13^1 9^1 7^3 5^1 3^1 1^2$, $13^1 9^2 7^2 5^1 3^1$, $13^1 9^3 5^1 3^2 1^2$, $13^1 9^3 7^1 5^1 1^1$, $13^1 11^1 7^3 3^2 1^2$,
 $13^1 11^1 7^4 1^1$, $13^1 11^1 9^1 7^2 3^2$, $13^1 11^1 9^2 7^1 3^1 1^1$, $13^1 11^1 9^3 1^2$, $13^1 11^2 5^2 3^2 1^2$,
 $13^1 11^2 7^1 5^2 1^1$, $13^1 11^3 5^1 1^2$, $13^2 7^2 5^1 3^2 1^2$, $13^2 7^3 5^1 1^1$, $13^2 9^1 7^1 5^1 3^2$,
 $13^2 9^2 5^1 3^1 1^1$, $13^2 11^1 7^2 1^2$, $13^2 11^1 9^1 3^2 1^1$, $13^2 11^1 9^1 7^1$, $13^3 7^1 5^1 1^2$, $13^3 9^1 5^1$,
 $13^3 11^1 3^1$, $15^1 7^4 5^1 3^1 1^2$, $15^1 9^1 7^3 5^1 3^1$, $15^1 9^2 7^1 5^1 3^2 1^2$, $15^1 9^2 7^2 5^1 1^1$,
 $15^1 9^3 5^1 3^2$, $15^1 11^1 7^3 3^2$, $15^1 11^1 9^1 7^2 3^1 1^1$, $15^1 11^1 9^2 7^1 1^2$, $15^1 11^1 9^3$,
 $15^1 11^2 5^2 3^2$, $15^1 11^3 5^1$, $15^1 13^1 7^2 5^1 3^2$, $15^1 13^1 9^1 7^1 5^1 3^1 1^1$, $15^1 13^1 9^2 5^1 1^2$,
 $15^1 13^1 11^1 7^1 3^2 1^1$, $15^1 13^1 11^1 7^2$, $15^1 13^1 11^1 9^1 3^1 1^2$, $15^1 13^2 5^1 3^2 1^1$,
 $15^1 13^2 7^1 5^1$, $15^1 13^2 11^1 1^1$, $15^2 7^2 5^1 3^1 1^1$, $15^2 9^1 7^1 5^1 1^2$, $15^2 9^2 5^1$,
 $15^2 11^1 7^1 3^1 1^2$, $15^2 11^1 9^1 3^1$, $15^2 13^1 5^1 3^1 1^2$, $15^3 5^1 3^1$, $17^1 7^4 3^2 1^2$, $17^1 7^5 1^1$,
 $17^1 9^1 7^3 3^2$, $17^1 9^2 7^2 3^1 1^1$, $17^1 9^3 7^1 1^2$, $17^1 9^4$, $17^1 11^1 7^1 5^2 3^2 1^2$,
 $17^1 11^1 7^2 5^2 1^1$, $17^1 11^1 9^1 5^2 3^2$, $17^1 11^2 7^1 5^1 1^2$, $17^1 11^2 9^1 5^1$, $17^1 11^3 3^1$,
 $17^1 13^1 7^1 5^3 1^1$, $17^1 13^1 7^3 1^2$, $17^1 13^1 9^1 7^1 3^2 1^1$, $17^1 13^1 9^1 7^2$, $17^1 13^1 9^2 3^1 1^2$,
 $17^1 13^1 11^1 5^2 1^2$, $17^1 13^2 3^3 1^1$, $17^1 13^2 7^1 3^1$, $17^1 15^1 5^3 3^2$, $17^1 15^1 7^2 3^2 1^1$,
 $17^1 15^1 7^3$, $17^1 15^1 9^1 7^1 3^1 1^2$, $17^1 15^1 9^2 3^1$, $17^1 15^1 11^1 5^2$, $17^1 15^1 13^1 3^2 1^2$,
 $17^2 5^2 3^3$, $17^2 7^1 5^2 1^2$, $19^1 7^2 5^4$, $19^1 7^3 5^1 3^2 1^2$, $19^1 7^4 5^1 1^1$, $19^1 9^1 7^2 5^1 3^2$,
 $19^1 9^2 7^1 5^1 3^1 1^1$, $19^1 9^3 5^1 1^2$, $19^1 11^1 5^3 3^2 1^2$, $19^1 11^1 7^1 5^3 1^1$, $19^1 11^1 7^3 1^2$,
 $19^1 11^1 9^1 7^1 3^2 1^1$, $19^1 11^1 9^1 7^2$, $19^1 11^1 9^2 3^1 1^2$, $19^1 11^2 5^2 1^2$, $19^1 13^1 5^4 1^1$,
 $19^1 13^1 7^2 5^1 1^2$, $19^1 13^1 9^1 5^1 3^2 1^1$, $19^1 13^1 9^1 7^1 5^1$, $19^1 13^1 11^1 3^3 1^1$,
 $19^1 13^1 11^1 7^1 1^3$, $19^1 15^1 7^1 5^1 3^2 1^1$, $19^1 15^1 9^1 5^1 3^1 1^2$, $21^1 7^1 5^4 3^1 1^2$, $21^1 7^3 5^1 3^2$,
 $21^1 9^1 5^4 3^1$, $21^1 9^1 7^2 5^1 3^1 1^1$, $21^1 9^2 5^1 3^3$, $21^1 9^2 7^1 5^1 1^2$, $21^1 11^1 5^3 3^2$,
 $21^1 11^1 7^2 3^2 1^1$, $21^1 11^1 7^3$, $21^1 11^1 9^1 3^4$, $21^1 11^1 9^1 7^1 3^1 1^2$, $23^1 3^{10}$, $23^1 5^3 3^5$,
 $23^1 5^6$, $23^1 7^1 3^7 1^2$, $23^1 7^1 5^3 3^2 1^2$, $23^1 7^2 3^5 1^1$, $23^1 7^2 5^3 1^1$, $23^1 7^3 3^3$

54: $8^5 6^2 2^1$, $8^6 6^1$, $10^1 8^3 6^2 4^2$, $10^1 8^4 4^2 2^2$, $10^2 8^2 6^2 4^1 2^1$, $10^2 8^3 6^1 4^1$,
 $10^3 8^1 6^2 2^2$, $10^3 8^2 6^1 2^1$, $10^3 8^3$, $10^4 6^1 4^2$, $10^5 4^1$, $12^1 8^4 6^1 2^2$, $12^1 8^5 2^1$,
 $12^1 10^1 8^1 6^2 4^2 2^2$, $12^1 10^1 8^2 6^1 4^2 2^1$, $12^1 10^1 8^3 4^2$, $12^1 10^2 8^1 6^1 4^1 2^2$,
 $12^1 10^2 8^2 4^1 2^1$, $12^1 10^3 6^2$, $12^1 10^3 8^1 2^2$, $12^2 8^2 6^2 2^1$, $12^2 8^3 6^1$, $12^2 10^1 6^2 4^2$,
 $12^2 10^1 8^1 4^2 2^2$, $12^2 10^2 6^1 4^1$, $12^2 10^3$, $12^3 8^1 6^1 2^2$, $12^3 8^2 2^1$, $12^3 10^1 4^2$, $12^4 6^1$,
 $14^1 8^3 6^2 2^2$, $14^1 8^4 6^1 2^1$, $14^1 8^5$, $14^1 10^1 8^1 6^2 4^2 2^1$, $14^1 10^1 8^2 6^1 4^2$,
 $14^1 10^2 6^2 4^1 2^2$, $14^1 10^2 8^1 6^1 4^1 2^1$, $14^1 10^2 8^2 4^1$, $14^1 10^3 6^1 2^2$, $14^1 10^3 8^1 2^1$,
 $14^1 12^1 8^2 6^2$, $14^1 12^1 8^3 2^2$, $14^1 12^1 10^1 6^1 4^2 2^2$, $14^1 12^1 10^1 8^1 4^2 2^1$,
 $14^1 12^1 10^2 4^1 2^2$, $14^1 12^2 6^2 2^2$, $14^1 12^2 8^1 6^1 2^1$, $14^1 12^2 8^2$, $14^1 12^3 2^2$, $14^2 6^4 2^1$,
 $14^2 8^1 6^3$, $14^2 8^2 6^1 2^2$, $14^2 8^3 2^1$, $14^2 10^1 6^1 4^2 2^1$, $14^2 10^1 8^1 4^2$, $14^2 10^2 4^1 2^1$,
 $14^2 12^1 6^2 2^1$, $14^2 12^1 8^1 6^1$, $14^2 12^2 2^1$, $14^3 6^2$, $14^3 8^1 2^2$, $14^3 12^1$, $16^1 8^2 6^2 4^2 2^1$,
 $16^1 8^3 6^1 4^2$, $16^1 10^1 8^1 6^2 4^1 2^2$, $16^1 10^1 8^2 6^1 4^1 2^1$, $16^1 10^1 8^3 4^1$, $16^1 10^2 6^3$,
 $16^1 10^2 8^1 6^1 2^2$, $16^1 10^2 8^2 2^1$, $16^1 10^3 4^2$, $16^1 12^1 6^3 4^2$, $16^1 12^1 8^1 6^1 4^2 2^2$,

$16^1 12^1 8^2 4^2 2^1, 16^1 12^1 10^1 6^2 4^1, 16^1 12^1 10^1 8^1 4^1 2^2, 16^1 12^1 10^2 6^1,$
 $16^1 12^2 6^1 4^2, 16^1 12^2 10^1 4^1, 16^1 14^1 6^2 4^2 2^2, 16^1 14^1 8^1 6^1 4^2 2^1, 16^1 14^1 8^2 4^2,$
 $16^1 14^1 10^1 6^1 4^1 2^2, 16^1 14^1 10^1 8^1 4^1 2^1, 16^1 14^1 10^2 2^2, 16^1 14^1 12^1 4^2 2^2,$
 $16^1 14^2 4^2 2^1, 16^2 6^3 4^1, 16^2 8^1 6^1 4^1 2^2, 16^2 8^2 4^1 2^1, 16^2 10^1 4^3, 16^2 10^1 6^2,$
 $16^2 10^1 8^1 2^2, 16^2 12^1 6^1 4^1, 16^2 14^1 4^1 2^2, 16^3 6^1, 18^1 8^1 6^4 2^2, 18^1 8^2 6^3 2^1,$
 $18^1 8^3 6^2, 18^1 8^4 2^2, 18^1 10^1 6^3 4^2, 18^1 10^1 8^1 6^1 4^2 2^2, 18^1 10^1 8^2 4^2 2^1,$
 $18^1 10^2 6^2 4^1, 18^1 10^2 8^1 4^1 2^2, 18^1 10^3 6^1, 18^1 12^1 6^4, 18^1 12^1 8^1 6^2 2^2,$
 $18^1 12^1 8^2 6^1 2^1, 18^1 12^1 8^3, 18^1 12^1 10^1 6^1 4^2, 18^1 12^1 10^2 4^1, 18^1 12^2 6^2,$
 $18^1 12^2 8^1 2^2, 18^1 12^3, 18^1 14^1 6^3 2^2, 18^1 14^1 8^1 6^2 2^1, 18^1 14^1 8^2 6^1,$
 $18^1 14^1 10^1 4^2 2^2, 18^1 14^1 12^1 6^1 2^2, 18^1 14^1 12^1 8^1 2^1, 18^1 14^2 2^4, 18^1 16^1 4^5,$
 $18^1 16^1 6^2 4^2, 18^1 16^1 8^1 4^2 2^2, 18^1 16^1 10^1 6^1 4^1, 18^3, 20^1 6^5 2^2, 20^1 8^1 6^4 2^1,$
 $20^1 8^2 6^3, 20^1 8^3 6^1 2^2, 20^1 8^4 2^1, 20^1 10^1 6^2 4^2 2^2, 20^1 10^1 8^1 6^1 4^2 2^1,$
 $20^1 10^1 8^2 4^2, 20^1 10^2 6^1 4^1 2^2, 20^1 10^2 8^1 4^1 2^1, 20^1 10^3 2^2, 20^1 12^1 6^3 2^2,$
 $20^1 12^1 8^1 4^3 2^1, 20^1 12^1 8^1 6^2 2^1, 20^1 12^1 8^2 6^1, 20^1 12^1 10^1 4^2 2^2, 20^1 12^2 6^1 2^2,$
 $20^1 14^1 6^1 4^3 2^1, 20^1 14^1 6^3 2^1, 20^1 14^1 8^1 4^3, 20^1 14^1 8^1 6^2, 20^1 14^1 8^2 2^2,$
 $20^1 14^1 10^1 4^2 2^1, 22^1 4^8, 22^1 6^2 4^5, 22^1 6^4 4^2, 22^1 8^1 4^5 2^2, 22^1 8^1 6^2 4^2 2^2,$
 $22^1 8^2 6^1 4^2 2^1, 22^1 8^3 4^2, 22^1 10^1 6^1 4^4, 22^1 10^1 6^3 4^1, 22^1 10^1 8^1 6^1 4^1 2^2,$
 $22^1 10^1 8^2 4^1 2^1, 22^1 10^2 4^3, 22^1 10^2 6^1 2^3, 24^1 6^1 4^6, 24^1 6^3 4^3, 24^1 6^5, 26^1 2^{14}$

55: $9^4 7^2 3^1 1^2, 9^5 7^1 3^1, 9^6 1^1, 11^1 9^2 7^2 5^2 1^2, 11^1 9^3 5^2 3^2 1^1, 11^1 9^3 7^1 5^2,$
 $11^2 9^1 7^2 5^1 3^1 1^2, 11^2 9^2 7^1 5^1 3^1, 11^2 9^3 5^1 1^1, 11^3 7^2 3^2 1^2, 11^3 9^1 7^1 3^2,$
 $11^3 9^2 3^1 1^1, 11^4 5^2 1^1, 13^1 9^2 7^3 3^1, 13^1 9^3 7^1 3^2 1^2, 13^1 9^3 7^2 1^1, 13^1 9^4 3^2,$
 $13^1 11^1 7^2 5^2 3^2 1^1, 13^1 11^1 7^3 5^2, 13^1 11^1 9^1 7^1 5^2 3^1 1^2, 13^1 11^1 9^2 5^2 3^1,$
 $13^1 11^2 7^1 5^1 3^2 1^2, 13^1 11^2 7^2 5^1 1^1, 13^1 11^2 9^1 5^1 3^2, 13^1 11^3 7^1 1^2, 13^1 11^3 9^1,$
 $13^2 7^3 3^2 1^2, 13^2 7^4 1^1, 13^2 9^1 7^2 3^2, 13^2 9^2 7^1 3^1 1^1, 13^2 9^3 1^2, 13^2 11^1 5^2 3^2 1^2,$
 $13^2 11^1 7^1 5^2 1^1, 13^2 11^2 5^1 1^2, 13^3 7^2 1^2, 13^3 9^1 3^2 1^1, 13^3 9^1 7^1, 13^4 3^1, 15^1 7^5 3^1 1^2,$
 $15^1 9^1 7^4 3^1, 15^1 9^2 7^2 3^2 1^2, 15^1 9^2 7^3 1^1, 15^1 9^3 7^1 3^2, 15^1 9^4 3^1 1^1,$
 $15^1 11^1 7^2 5^2 3^1 1^2, 15^1 11^1 9^1 7^1 5^2 3^1, 15^1 11^1 9^2 5^2 1^1, 15^1 11^2 7^1 5^1 3^2,$
 $15^1 11^2 9^1 5^1 3^1 1^1, 15^1 11^3 3^2 1^1, 15^1 11^3 7^1, 15^1 13^1 7^3 3^2, 15^1 13^1 9^1 7^2 3^1 1^1,$
 $15^1 13^1 9^2 7^1 1^2, 15^1 13^1 9^3, 15^1 13^1 11^1 5^2 3^2, 15^1 13^1 11^2 5^1, 15^1 13^2 7^1 3^2 1^1,$
 $15^1 13^2 7^2, 15^1 13^2 9^1 3^1 1^2, 15^1 13^3 1^1, 15^2 7^3 3^1 1^1, 15^2 9^1 7^2 1^2, 15^2 9^2 3^2 1^1,$
 $15^2 9^2 7^1, 15^2 11^1 5^2 3^1 1^1, 15^2 13^1 7^1 3^1 1^2, 15^2 13^1 9^1 3^1, 15^3 7^1 3^1, 15^3 9^1 1^1,$
 $17^1 7^3 5^2 3^2 1^1, 17^1 7^4 5^2, 17^1 9^1 7^2 5^2 3^1 1^2, 17^1 9^2 7^1 5^2 3^1, 17^1 9^3 5^2 1^1,$
 $17^1 11^1 7^2 5^1 3^2 1^2, 17^1 11^1 7^3 5^1 1^1, 17^1 11^1 9^1 7^1 5^1 3^2, 17^1 11^1 9^2 5^1 3^1 1^1,$
 $17^1 11^2 7^2 1^2, 17^1 11^2 9^1 3^2 1^1, 17^1 11^2 9^1 7^1, 17^1 13^1 7^1 5^2 3^2 1^2, 17^1 13^1 7^2 5^2 1^1,$
 $17^1 13^1 9^1 5^2 3^2, 17^1 13^1 11^1 7^1 5^1 1^2, 17^1 13^1 11^1 9^1 5^1, 17^1 13^1 11^2 3^1, 17^1 13^2 5^2 1^2,$
 $17^1 15^1 7^1 5^2 3^2, 17^1 15^1 9^1 5^2 3^1 1^1, 17^1 15^1 11^1 5^1 3^2 1^1, 17^1 15^1 11^1 7^1 5^1,$
 $17^1 15^1 11^2 1^1, 17^1 15^1 13^1 5^2, 17^2 5^4 1^1, 17^2 7^2 5^1 1^2, 17^2 9^1 5^1 3^2 1^1, 17^2 9^1 7^1 5^1,$
 $17^2 11^1 3^3 1^1, 17^2 11^1 7^1 3^1, 17^2 13^1 5^1 1^3, 17^3 3^1 1^1, 19^1 7^4 3^2 1^2, 19^1 7^5 1^1,$
 $19^1 9^1 7^3 3^2, 19^1 9^2 7^2 3^1 1^1, 19^1 9^3 7^1 1^2, 19^1 9^4, 19^1 11^1 7^1 5^2 3^2 1^2,$
 $19^1 11^1 7^2 5^2 1^1, 19^1 11^1 9^1 5^2 3^2, 19^1 11^2 7^1 5^1 1^2, 19^1 11^2 9^1 5^1, 19^1 11^3 3^1,$
 $19^1 13^1 5^3 3^2 1^2, 19^1 13^1 7^1 5^3 1^1, 19^1 13^1 7^3 1^2, 19^1 13^1 9^1 7^1 3^2 1^1, 19^1 13^1 9^1 7^2,$
 $19^1 13^1 9^2 3^1 1^2, 19^1 13^1 11^1 5^2 1^2, 19^1 13^2 3^3 1^1, 19^1 13^2 7^1 3^1, 19^1 15^1 5^3 3^2.$

$19^1 15^1 7^2 3^2 1^1, 19^1 15^1 7^3, 19^1 15^1 9^1 7^1 3^1 1^2, 19^1 15^1 9^2 3^1, 19^1 15^1 11^1 5^2,$
 $19^1 17^1 5^2 3^3, 19^1 17^1 7^1 5^2 1^2, 21^1 5^6 3^1 1^1, 21^1 7^2 5^3 3^1 1^2, 21^1 7^4 3^2,$
 $21^1 9^1 7^1 5^3 3^1, 21^1 9^1 7^3 3^1 1^1, 21^1 9^2 5^3 1^1, 21^1 9^2 7^2 1^2, 21^1 9^3 3^2 1^1, 21^1 9^3 7^1,$
 $21^1 11^1 7^1 5^2 3^2, 21^1 11^1 9^1 5^2 3^1 1^1, 21^1 11^2 5^1 3^2 1^1, 21^1 11^2 7^1 5^1, 21^1 11^3 1^1,$
 $21^1 13^1 5^3 3^2, 21^1 13^1 7^2 3^2 1^1, 21^1 13^1 7^3, 21^1 13^1 9^1 3^4, 21^1 13^1 9^1 7^1 3^1 1^2,$
 $21^1 13^1 9^2 1^3, 23^1 5^5 3^2 1^1, 23^1 7^1 5^5, 23^1 7^2 5^2 3^2 1^2, 23^1 7^3 5^2 1^1, 23^1 9^1 7^1 5^2 3^2,$
 $23^1 9^2 5^2 3^1 1^1, 25^1 3^{10}, 25^1 5^3 3^5, 25^1 5^6, 27^1 1^{28}$

56: $8^6 6^1 2^1, 10^1 8^3 6^2 4^2 2^1, 10^1 8^4 6^1 4^2, 10^2 8^3 6^1 4^1 2^1, 10^2 8^4 4^1, 10^3 8^2 6^1 2^2,$
 $10^3 8^3 2^1, 10^4 6^1 4^2 2^1, 10^4 8^1 4^2, 10^5 4^1 2^1, 12^1 8^4 6^2, 12^1 8^5 2^2,$
 $12^1 10^1 8^2 6^1 4^2 2^2, 12^1 10^1 8^3 4^2 2^1, 12^1 10^2 8^1 6^2 4^1, 12^1 10^2 8^2 4^1 2^2,$
 $12^1 10^3 6^2 2^1, 12^1 10^3 8^1 6^1, 12^2 8^2 6^2 2^2, 12^2 8^3 6^1 2^1, 12^2 8^4, 12^2 10^1 6^2 4^2 2^1,$
 $12^2 10^1 8^1 6^1 4^2, 12^2 10^2 6^1 4^1 2^1, 12^2 10^2 8^1 4^1, 12^2 10^3 2^1, 12^3 8^1 6^2, 12^3 8^2 2^2,$
 $12^3 10^1 4^2 2^1, 12^4 6^1 2^1, 12^4 8^1, 14^1 8^4 6^1 2^2, 14^1 8^5 2^1, 14^1 10^1 8^1 6^2 4^2 2^2,$
 $14^1 10^1 8^2 6^1 4^2 2^1, 14^1 10^1 8^3 4^2, 14^1 10^2 8^1 6^1 4^1 2^2, 14^1 10^2 8^2 4^1 2^1, 14^1 10^3 6^2,$
 $14^1 10^3 8^1 2^2, 14^1 12^1 8^2 6^2 2^1, 14^1 12^1 8^3 6^1, 14^1 12^1 10^1 6^2 4^2,$
 $14^1 12^1 10^1 8^1 4^2 2^2, 14^1 12^1 10^2 6^1 4^1, 14^1 12^1 10^3, 14^1 12^2 6^3, 14^1 12^2 8^1 6^1 2^2,$
 $14^1 12^2 8^2 2^1, 14^1 12^2 10^1 4^2, 14^1 12^3 6^1, 14^2 8^2 6^2, 14^2 8^3 2^2, 14^2 10^1 6^1 4^2 2^2,$
 $14^2 10^1 8^1 4^2 2^1, 14^2 10^2 4^1 2^2, 14^2 12^1 6^2 2^2, 14^2 12^1 8^1 6^1 2^1, 14^2 12^1 8^2,$
 $14^2 12^2 2^2, 14^3 6^2 2^1, 14^3 8^1 6^1, 14^3 12^1 2^1, 14^4, 16^1 8^2 6^2 4^2 2^2, 16^1 8^3 6^1 4^2 2^1,$
 $16^1 8^4 4^2, 16^1 10^1 8^2 6^1 4^1 2^2, 16^1 10^1 8^3 4^1 2^1, 16^1 10^2 8^1 6^2, 16^1 10^2 8^2 2^2,$
 $16^1 10^3 4^2 2^1, 16^1 12^1 8^1 6^2 4^2, 16^1 12^1 8^2 4^2 2^2, 16^1 12^1 10^1 6^2 4^1 2^1,$
 $16^1 12^1 10^1 8^1 6^1 4^1, 16^1 12^1 10^2 6^1 2^1, 16^1 12^1 10^2 8^1, 16^1 12^2 6^1 4^2 2^1,$
 $16^1 12^2 8^1 4^2, 16^1 12^2 10^1 4^1 2^1, 16^1 14^1 6^3 4^2, 16^1 14^1 8^1 6^1 4^2 2^2, 16^1 14^1 8^2 4^2 2^1,$
 $16^1 14^1 10^1 6^2 4^1, 16^1 14^1 10^1 8^1 4^1 2^2, 16^1 14^1 10^2 6^1, 16^1 14^1 12^1 10^1 4^1,$
 $16^1 14^1 12^1 6^1 4^2, 16^1 14^2 4^2 2^2, 16^2 6^3 4^1 2^1, 16^2 8^1 6^2 4^1, 16^2 8^2 4^1 2^2,$
 $16^2 10^1 6^2 2^1, 16^2 10^1 8^1 6^1, 16^2 12^1 6^1 4^1 2^1, 16^2 12^1 8^1 4^1, 16^2 12^1 10^1 2^1,$
 $16^2 14^1 6^1 4^1, 16^3 6^1 2^1, 16^3 8^1, 18^1 8^3 6^2 2^1, 18^1 8^4 6^1, 18^1 10^1 8^1 6^2 4^2,$
 $18^1 10^1 8^2 4^2 2^2, 18^1 10^2 6^2 4^1 2^1, 18^1 10^2 8^1 6^1 4^1, 18^1 10^3 6^1 2^1, 18^1 10^3 8^1,$
 $18^1 12^1 6^4 2^1, 18^1 12^1 8^1 6^3, 18^1 12^1 8^2 6^1 2^2, 18^1 12^1 8^3 2^1, 18^1 12^1 10^1 6^1 4^2 2^1,$
 $18^1 12^1 10^1 8^1 4^2, 18^1 12^1 10^2 4^1 2^1, 18^1 12^2 6^2 2^1, 18^1 12^2 8^1 6^1, 18^1 12^3 2^1,$
 $18^1 14^1 6^4, 18^1 14^1 8^1 6^2 2^2, 18^1 14^1 8^2 6^1 2^1, 18^1 14^1 8^3, 18^1 14^1 10^1 6^1 4^2,$
 $18^1 14^1 10^2 4^1, 18^1 14^1 12^1 4^3, 18^1 14^1 12^1 6^2, 18^1 14^1 12^1 8^1 2^2, 18^1 14^2 6^1 2^2,$
 $18^1 14^2 8^1 2^1, 18^1 16^1 6^2 4^2 2^1, 18^1 16^1 8^1 6^1 4^2, 18^1 16^1 10^1 6^1 4^1 2^1,$
 $18^1 16^1 10^1 8^1 4^1, 18^1 16^1 10^2 2^1, 18^1 16^1 12^1 4^2 2^1, 18^2 8^1 4^3, 18^2 8^1 6^2, 18^2 8^2 2^2,$
 $18^2 10^1 4^2 2^1, 18^3 2^1, 20^1 6^6, 20^1 8^1 6^4 2^2, 20^1 8^2 6^3 2^1, 20^1 8^3 6^2, 20^1 8^4 2^2,$
 $20^1 10^1 6^3 4^2, 20^1 10^1 8^1 6^1 4^2 2^2, 20^1 10^1 8^2 4^2 2^1, 20^1 10^2 6^2 4^1, 20^1 10^2 8^1 4^1 2^2,$
 $20^1 10^3 6^1, 20^1 12^1 6^4, 20^1 12^1 8^1 6^2 2^2, 20^1 12^1 8^2 6^1 2^1, 20^1 12^1 8^3,$
 $20^1 12^1 10^1 6^1 4^2, 20^1 12^1 10^2 4^1, 20^1 12^2 6^2, 20^1 12^2 8^1 2^2, 20^1 12^3, 20^1 14^1 6^3 2^2,$
 $20^1 14^1 8^1 4^3 2^1, 20^1 14^1 8^1 6^2 2^1, 20^1 14^1 8^2 6^1, 20^1 14^1 10^1 4^2 2^2,$
 $20^1 14^1 12^1 6^1 2^2, 20^1 16^1 4^5, 20^1 16^1 6^2 4^2, 20^1 16^1 8^1 4^2 2^2, 20^1 16^1 10^1 4^1 2^3,$
 $22^1 6^4 4^2 2^1, 22^1 8^1 6^3 4^2, 22^1 8^2 6^1 4^2 2^2, 22^1 8^3 4^2 2^1, 22^1 10^1 6^3 4^1 2^1,$
 $22^1 10^1 8^1 4^4, 22^1 10^1 8^1 6^2 4^1, 22^1 10^1 8^2 4^1 2^2, 22^1 10^2 6^2 2^1, 22^1 10^2 8^1 6^1,$

$22^1 12^1 4^5 2^1, 22^1 12^1 6^2 4^2 2^1, 22^1 12^1 8^1 6^1 4^2, 22^1 12^1 10^1 6^1 4^1 2^1,$
 $22^1 12^1 10^2 2^1, 24^1 6^1 4^6 2^1, 24^1 6^3 4^3 2^1, 24^1 6^5 2^1, 24^1 8^1 4^6, 24^1 8^1 6^2 4^3,$
 $24^1 8^1 6^4, 24^1 8^2 4^3 2^2, 24^1 8^2 6^2 2^2, 24^1 8^4, 26^1 2^1 5, 26^1 4^3 2^9, 26^1 4^6 2^3,$
57: $9^4 7^2 3^2 1^1, 9^5 7^1 3^1 1^2, 9^6 3^1, 11^1 9^2 7^2 5^2 3^1 1^1, 11^1 9^3 7^1 5^2 1^2, 11^1 9^4 5^2,$
 $11^2 9^1 7^2 5^1 3^2 1^1, 11^2 9^2 7^1 5^1 3^1 1^2, 11^2 9^3 5^1 3^1, 11^3 9^1 7^1 3^2 1^2, 11^3 9^1 7^2 1^1,$
 $11^3 9^2 3^2, 11^4 5^2 3^1, 13^1 9^3 7^2 3^1, 13^1 9^4 3^2 1^2, 13^1 9^4 7^1 1^1, 13^1 11^1 9^1 7^1 5^2 3^2 1^1,$
 $13^1 11^1 9^1 7^2 5^2, 13^1 11^1 9^2 5^2 3^1 1^2, 13^1 11^2 7^2 5^1 3^1, 13^1 11^2 9^1 5^1 3^2 1^2,$
 $13^1 11^2 9^1 7^1 5^1 1^1, 13^1 11^3 7^1 3^1 1^1, 13^1 11^3 9^1 1^2, 13^2 7^4 3^1, 13^2 9^1 7^2 3^2 1^2,$
 $13^2 9^1 7^3 1^1, 13^2 9^2 7^1 3^2, 13^2 9^3 3^1 1^1, 13^2 11^1 7^1 5^2 3^1, 13^2 11^1 9^1 5^2 1^1,$
 $13^2 11^2 5^1 3^1 1^1, 13^3 7^2 3^1 1^1, 13^3 9^1 7^1 1^2, 13^3 9^2, 13^4 3^1 1^2, 15^1 9^2 7^3 3^1,$
 $15^1 9^3 7^1 3^2 1^2, 15^1 9^3 7^2 1^1, 15^1 9^4 3^2, 15^1 11^1 7^2 5^2 3^2 1^1, 15^1 11^1 7^3 5^2,$
 $15^1 11^1 9^1 7^1 5^2 3^1 1^2, 15^1 11^1 9^2 5^2 3^1, 15^1 11^2 7^1 5^1 3^2 1^2, 15^1 11^2 7^2 5^1 1^1,$
 $15^1 11^2 9^1 5^1 3^2, 15^1 11^3 7^1 1^2, 15^1 11^3 9^1, 15^1 13^1 7^3 3^2 1^2, 15^1 13^1 7^4 1^1,$
 $15^1 13^1 9^1 7^2 3^2, 15^1 13^1 9^2 7^1 3^1 1^1, 15^1 13^1 9^3 1^2, 15^1 13^1 11^1 5^2 3^2 1^2,$
 $15^1 13^1 11^1 7^1 5^2 1^1, 15^1 13^1 11^2 5^1 1^2, 15^1 13^2 7^2 1^2, 15^1 13^2 9^1 3^2 1^1, 15^1 13^2 9^1 7^1,$
 $15^1 13^3 3^1, 15^2 7^3 3^2, 15^2 9^1 7^2 3^1 1^1, 15^2 9^2 7^1 1^2, 15^2 9^3, 15^2 11^1 5^2 3^2, 15^2 11^2 5^1,$
 $15^2 13^1 7^1 3^2 1^1, 15^2 13^1 7^2, 15^2 13^1 9^1 3^1 1^2, 15^2 13^2 1^1, 15^3 7^1 3^1 1^2, 15^3 9^1 3^1,$
 $17^1 7^4 5^2 1^2, 17^1 9^1 7^2 5^2 3^2 1^1, 17^1 9^1 7^3 5^2, 17^1 9^2 7^1 5^2 3^1 1^2, 17^1 9^3 5^2 3^1,$
 $17^1 11^1 7^3 5^1 3^1, 17^1 11^1 9^1 7^1 5^1 3^2 1^2, 17^1 11^1 9^1 7^2 5^1 1^1, 17^1 11^1 9^2 5^1 3^2,$
 $17^1 11^2 7^2 3^1 1^1, 17^1 11^2 9^1 7^1 1^2, 17^1 11^2 9^2, 17^1 13^1 7^2 5^2 3^1, 17^1 13^1 9^1 5^2 3^2 1^2,$
 $17^1 13^1 9^1 7^1 5^2 1^1, 17^1 13^1 11^1 7^1 5^1 3^1 1^1, 17^1 13^1 11^1 9^1 5^1 1^2, 17^1 13^1 11^2 3^1 1^2,$
 $17^1 13^2 5^2 3^1 1^1, 17^1 15^1 7^1 5^2 3^2 1^2, 17^1 15^1 7^2 5^2 1^1, 17^1 15^1 9^1 5^2 3^2,$
 $17^1 15^1 11^1 7^1 5^1 1^2, 17^1 15^1 11^1 9^1 5^1, 17^1 15^1 11^2 3^1, 17^1 15^1 13^1 5^2 1^2, 17^1 15^2 5^2,$
 $17^2 7^2 5^1 3^1 1^1, 17^2 9^1 7^1 5^1 1^2, 17^2 9^2 5^1, 17^2 11^1 7^1 3^1 1^2, 17^2 11^1 9^1 3^1,$
 $17^2 13^1 5^1 3^1 1^2, 17^2 15^1 5^1 3^1, 17^3 3^2, 19^1 7^5 3^1, 19^1 9^1 7^3 3^2 1^2, 19^1 9^1 7^4 1^1,$
 $19^1 9^2 7^2 3^2, 19^1 9^3 7^1 3^1 1^1, 19^1 9^4 1^2, 19^1 11^1 7^2 5^2 3^1, 19^1 11^1 9^1 5^2 3^2 1^2,$
 $19^1 11^1 9^1 7^1 5^2 1^1, 19^1 11^2 7^1 5^1 3^1 1^1, 19^1 11^2 9^1 5^1 1^2, 19^1 11^3 3^1 1^2,$
 $19^1 13^1 7^3 3^1 1^1, 19^1 13^1 9^1 5^3 1^1, 19^1 13^1 9^1 7^2 1^2, 19^1 13^1 9^2 3^2 1^1, 19^1 13^1 9^2 7^1,$
 $19^1 13^1 11^1 5^2 3^1 1^1, 19^1 13^2 7^1 3^1 1^2, 19^1 13^2 9^1 3^1, 19^1 15^1 5^3 3^2 1^2, 19^1 15^1 7^1 5^3 1^1,$
 $19^1 15^1 7^3 1^2, 19^1 15^1 9^1 7^1 3^2 1^1, 19^1 15^1 9^1 7^2, 19^1 15^1 9^2 3^1 1^2, 19^1 15^1 11^1 5^2 1^2,$
 $19^1 15^1 13^1 3^3 1^1, 19^1 15^1 13^1 7^1 3^1, 19^1 15^2 1^8, 19^1 17^1 7^1 5^2 3^1 1^1, 19^1 17^1 9^1 5^2 1^2,$
 $19^1 17^1 11^1 5^1 3^1 1^2, 19^3, 21^1 7^4 3^2 1^2, 21^1 7^5 1^1, 21^1 9^1 7^3 3^2, 21^1 9^2 5^3 3^1,$
 $21^1 9^2 7^2 3^1 1^1, 21^1 9^3 7^1 1^2, 21^1 9^4, 21^1 11^1 5^5, 21^1 11^1 7^1 5^2 3^2 1^2, 21^1 11^1 7^2 5^2 1^1,$
 $21^1 11^1 9^1 5^2 3^2, 21^1 11^2 7^1 5^1 1^2, 21^1 11^2 9^1 5^1, 21^1 11^3 3^1, 21^1 13^1 5^3 3^2 1^2,$
 $21^1 13^1 7^1 5^3 1^1, 21^1 13^1 7^3 1^2, 21^1 13^1 9^1 7^1 3^2 1^1, 21^1 13^1 9^1 7^2, 21^1 13^1 9^2 3^1 1^2,$
 $21^1 13^1 11^1 5^2 1^2, 21^1 13^2 3^3 1^1, 21^1 15^1 5^3 3^2, 21^1 15^1 7^2 3^2 1^1, 21^1 15^1 7^3,$
 $21^1 15^1 9^1 3^4, 21^1 15^1 9^1 7^1 3^1 1^2, 23^1 7^1 5^5 1^2, 23^1 7^3 5^2 3^1, 23^1 9^1 5^5,$
 $23^1 9^1 7^1 5^2 3^2 1^2, 23^1 9^1 7^2 5^2 1^1, 23^1 9^2 5^2 3^2, 23^1 11^1 5^4 3^1, 23^1 11^1 7^2 5^1 3^1 1^1,$
 $23^1 11^1 9^1 5^1 3^3, 23^1 11^1 9^1 7^1 5^1 1^2, 23^1 11^2 3^4, 25^1 3^1 10^1 1^2, 25^1 5^3 3^5 1^2, 25^1 5^6 1^2,$
 $25^1 7^1 3^8 1^1, 25^1 7^1 5^3 3^3 1^1, 25^1 7^2 3^6, 25^1 7^2 5^3 3^1, 25^1 7^3 3^3 1^2, 27^1 3^1 10$

58: $10^2 8^2 6^2 4^2 2^1$, $10^3 8^2 6^1 4^1 2^1$, $10^3 8^3 4^1$, $10^4 8^1 6^1 2^2$, $10^4 8^2 2^1$, $10^5 4^2$,
 $12^1 8^5 4^1 2^1$, $12^1 10^1 8^3 6^2$, $12^1 10^1 8^4 2^2$, $12^1 10^2 8^2 4^2 2^1$, $12^1 10^3 6^2 4^1$,
 $12^1 10^3 8^1 4^1 2^2$, $12^1 10^4 6^1$, $12^2 8^2 6^2 4^1 2^1$, $12^2 8^3 6^1 4^1$, $12^2 10^1 8^1 6^2 2^2$,
 $12^2 10^1 8^2 6^1 2^1$, $12^2 10^1 8^3$, $12^2 10^2 6^1 4^2$, $12^2 10^3 4^1$, $12^3 8^2 4^1 2^1$, $12^3 10^1 6^2$,
 $12^3 10^1 8^1 2^2$, $12^4 6^1 4^1$, $12^4 10^1$, $14^1 8^4 6^1 4^1 2^1$, $14^1 8^5 4^1$, $14^1 10^1 8^3 6^1 2^2$,
 $14^1 10^1 8^4 2^1$, $14^1 10^2 6^2 4^2 2^2$, $14^1 10^2 8^1 6^1 4^2 2^1$, $14^1 10^2 8^2 4^2$, $14^1 10^3 6^1 4^1 2^2$,
 $14^1 10^3 8^1 4^1 2^1$, $14^1 10^4 2^2$, $14^1 12^1 8^2 6^2 4^1$, $14^1 12^1 8^3 4^1 2^2$, $14^1 12^1 10^1 8^1 6^2 2^1$,
 $14^1 12^1 10^1 8^2 6^1$, $14^1 12^1 10^2 4^2 2^2$, $14^1 12^2 6^2 4^1 2^2$, $14^1 12^2 8^1 6^1 4^1 2^1$,
 $14^1 12^2 8^2 4^1$, $14^1 12^2 10^1 6^1 2^2$, $14^1 12^2 10^1 8^1 2^1$, $14^1 12^3 4^1 2^2$, $14^2 8^2 6^1 4^1 2^2$,
 $14^2 8^3 4^1 2^1$, $14^2 10^1 8^1 6^2$, $14^2 10^1 8^2 2^2$, $14^2 10^2 4^2 2^1$, $14^2 12^1 6^2 4^1 2^1$,
 $14^2 12^1 8^1 6^1 4^1$, $14^2 12^1 10^1 6^1 2^1$, $14^2 12^1 10^1 8^1$, $14^2 12^2 4^1 2^1$, $14^3 6^2 4^1$,
 $14^3 8^1 4^1 2^2$, $14^3 10^1 6^1$, $14^3 12^1 4^1$, $16^1 8^4 6^1 2^2$, $16^1 8^5 2^1$, $16^1 10^1 8^1 6^2 4^2 2^2$,
 $16^1 10^1 8^2 6^1 4^2 2^1$, $16^1 10^1 8^3 4^2$, $16^1 10^2 8^1 6^1 4^1 2^2$, $16^1 10^2 8^2 4^1 2^1$, $16^1 10^3 6^2$,
 $16^1 10^3 8^1 2^2$, $16^1 12^1 8^2 6^2 2^1$, $16^1 12^1 8^3 6^1$, $16^1 12^1 10^1 6^2 4^2$,
 $16^1 12^1 10^1 8^1 4^2 2^2$, $16^1 12^1 10^2 6^1 4^1$, $16^1 12^1 10^3$, $16^1 12^2 6^3$, $16^1 12^2 8^1 6^1 2^2$,
 $16^1 12^2 8^2 2^1$, $16^1 12^2 10^1 4^2$, $16^1 12^3 6^1$, $16^1 14^1 8^2 6^2$, $16^1 14^1 8^3 2^2$,
 $16^1 14^1 10^1 6^1 4^2 2^2$, $16^1 14^1 10^1 8^1 4^2 2^1$, $16^1 14^1 10^2 4^1 2^2$, $16^1 14^1 12^1 6^2 2^2$,
 $16^1 14^1 12^1 8^1 6^1 2^1$, $16^1 14^1 12^1 8^2$, $16^1 14^1 12^2 2^2$, $16^1 14^2 6^2 2^1$, $16^1 14^2 8^1 6^1$,
 $16^1 14^2 12^1 2^1$, $16^1 14^3$, $16^2 8^1 6^1 4^2 2^2$, $16^2 8^2 4^2 2^1$, $16^2 10^1 6^2 4^1$,
 $16^2 10^1 8^1 4^1 2^2$, $16^2 10^2 6^1$, $16^2 12^1 6^1 4^2$, $16^2 12^1 10^1 4^1$, $16^2 14^1 4^2 2^2$, $16^3 6^1 4^1$,
 $16^3 10^1$, $18^1 8^3 6^2 4^1$, $18^1 8^4 4^1 2^2$, $18^1 10^1 8^2 6^2 2^1$, $18^1 10^1 8^3 6^1$, $18^1 10^2 6^2 4^2$,
 $18^1 10^2 8^1 4^2 2^2$, $18^1 10^3 6^1 4^1$, $18^1 10^4$, $18^1 12^1 8^1 6^2 4^1 2^2$, $18^1 12^1 8^2 6^1 4^1 2^1$,
 $18^1 12^1 8^3 4^1$, $18^1 12^1 10^1 6^3$, $18^1 12^1 10^1 8^1 6^1 2^2$, $18^1 12^1 10^1 8^2 2^1$, $18^1 12^1 10^2 4^2$,
 $18^1 12^2 6^2 4^1$, $18^1 12^2 8^1 4^1 2^2$, $18^1 12^2 10^1 6^1$, $18^1 12^3 4^1$, $18^1 14^1 8^1 6^2 4^1 2^1$,
 $18^1 14^1 8^2 6^1 4^1$, $18^1 14^1 10^1 6^2 2^2$, $18^1 14^1 10^1 8^1 6^1 2^1$, $18^1 14^1 10^1 8^2$,
 $18^1 14^1 12^1 10^1 2^2$, $18^1 14^1 12^1 6^1 4^1 2^2$, $18^1 14^1 12^1 8^1 4^1 2^1$, $18^1 14^2 6^1 4^1 2^1$,
 $18^1 14^2 8^1 4^1$, $18^1 14^2 10^1 2^1$, $18^1 16^1 6^4$, $18^1 16^1 8^1 6^2 2^2$, $18^1 16^1 8^2 6^1 2^1$,
 $18^1 16^1 8^3$, $18^1 16^1 10^1 6^1 4^2$, $18^1 16^1 10^2 4^1$, $18^1 16^1 12^1 4^3$, $18^1 16^1 12^1 6^2$,
 $18^1 16^1 12^1 8^1 2^2$, $18^1 16^1 14^1 6^1 2^2$, $18^1 16^1 14^1 8^1 2^1$, $18^1 16^2 4^2$, $18^2 8^1 6^1 4^1 2^2$,
 $18^2 8^2 4^1 2^1$, $18^2 10^1 4^3$, $18^2 10^1 6^2$, $18^2 10^1 8^1 2^2$, $18^2 12^1 6^1 4^1$, $18^2 14^1 4^1 2^2$,
 $18^2 16^1 2^3$, $18^3 4^1$, $20^1 8^2 6^3 4^1$, $20^1 8^3 6^1 4^1 2^2$, $20^1 8^4 4^1 2^1$, $20^1 10^1 6^4 2^2$,
 $20^1 10^1 8^1 6^3 2^1$, $20^1 10^1 8^2 6^2$, $20^1 10^1 8^3 2^2$, $20^1 10^2 6^1 4^2 2^2$, $20^1 10^2 8^1 4^2 2^1$,
 $20^1 10^3 4^1 2^2$, $20^1 12^1 6^3 4^1 2^2$, $20^1 12^1 8^1 6^2 4^1 2^1$, $20^1 12^1 8^2 6^1 4^1$,
 $20^1 12^1 10^1 6^2 2^2$, $20^1 12^1 10^1 8^1 6^1 2^1$, $20^1 12^1 10^1 8^2$, $20^1 12^2 6^1 4^1 2^2$,
 $20^1 12^2 8^1 4^1 2^1$, $20^1 12^2 10^1 2^2$, $20^1 14^1 6^3 4^1 2^1$, $20^1 14^1 8^1 6^2 4^1$, $20^1 14^1 8^2 4^1 2^2$,
 $20^1 14^1 10^1 6^2 2^1$, $20^1 14^1 10^1 8^1 6^1$, $20^1 14^1 12^1 10^1 2^1$, $20^1 14^1 12^1 6^1 4^1 2^1$,
 $20^1 14^1 12^1 8^1 4^1$, $20^1 14^2 6^1 4^1$, $20^1 16^1 6^3 2^2$, $20^1 16^1 8^1 4^3 2^1$, $20^1 16^1 8^1 6^2 2^1$,
 $20^1 16^1 8^2 6^1$, $20^1 16^1 10^1 4^2 2^2$, $20^1 16^1 12^1 6^1 2^2$, $20^1 18^1 4^4 2^2$, $20^1 18^1 6^2 4^1 2^2$,
 $20^1 18^1 8^1 6^1 4^1 2^1$, $20^1 18^1 10^1 2^5$, $22^1 6^6$, $22^1 8^1 6^4 2^2$, $22^1 8^2 6^3 2^1$, $22^1 8^3 6^2$,
 $22^1 8^4 2^2$, $22^1 10^1 6^3 4^2$, $22^1 10^1 8^1 6^1 4^2 2^2$, $22^1 10^1 8^2 4^2 2^1$, $22^1 10^2 6^2 4^1$,
 $22^1 10^2 8^1 4^1 2^2$, $22^1 10^3 6^1$, $22^1 12^1 6^4$, $22^1 12^1 8^1 6^2 2^2$, $22^1 12^1 8^2 6^1 2^1$,
 $22^1 12^1 8^3$, $22^1 12^1 10^1 6^1 4^2$, $22^1 12^1 10^2 4^1$, $22^1 12^2 6^2$, $22^1 12^2 8^1 2^2$, $22^1 12^3$,
 $22^1 14^1 6^1 4^3 2^2$, $22^1 14^1 6^3 2^2$, $22^1 14^1 8^1 4^3 2^1$, $22^1 14^1 8^1 6^2 2^1$, $22^1 14^1 8^2 6^1$,

$22^1 14^1 10^1 4^2 2^2$, $24^1 6^1 4^7$, $24^1 6^3 4^4$, $24^1 6^5 4^1$, $24^1 8^1 6^1 4^4 2^2$, $24^1 8^1 6^3 4^1 2^2$,
 $24^1 8^2 4^4 2^1$, $24^1 8^2 6^2 4^1 2^1$, $24^1 8^3 6^1 4^1$, $24^1 10^1 4^6$, $24^1 10^1 6^2 4^3$, $24^1 10^1 6^4$,
 $24^1 10^1 8^1 4^3 2^2$, $24^1 10^1 8^1 6^2 2^2$, $24^1 10^1 8^2 6^1 2^1$, $24^1 10^1 8^3$, $24^1 10^2 6^1 4^2$,
 $26^1 4^7 2^2$, $26^1 6^2 4^4 2^2$, $26^1 6^4 4^1 2^2$, $28^1 2^{15}$

59: $9^5 7^1 5^1 1^2$, $9^6 5^1$, $11^1 9^3 7^2 3^2 1^1$, $11^1 9^4 7^1 3^1 1^2$, $11^1 9^5 3^1$, $11^2 9^2 7^1 5^2 1^2$,
 $11^2 9^3 5^2$, $11^3 9^1 7^1 5^1 3^1 1^2$, $11^3 9^2 5^1 3^1$, $11^4 7^1 3^2 1^2$, $11^4 7^2 1^1$, $11^4 9^1 3^2$,
 $13^1 9^3 7^1 5^1 3^2 1^1$, $13^1 9^3 7^2 5^1$, $13^1 9^4 5^1 3^1 1^2$, $13^1 11^1 9^2 7^2 3^1$, $13^1 11^1 9^3 3^2 1^2$,
 $13^1 11^1 9^3 7^1 1^1$, $13^1 11^2 7^1 5^2 3^2 1^1$, $13^1 11^2 7^2 5^2$, $13^1 11^2 9^1 5^2 3^1 1^2$,
 $13^1 11^3 5^1 3^2 1^2$, $13^1 11^3 7^1 5^1 1^1$, $13^1 11^4 1^2$, $13^2 9^1 7^2 5^1 3^1 1^2$, $13^2 9^2 7^1 5^1 3^1$,
 $13^2 9^3 5^1 1^1$, $13^2 11^1 7^2 3^2 1^2$, $13^2 11^1 7^3 1^1$, $13^2 11^1 9^1 7^1 3^2$, $13^2 11^1 9^2 3^1 1^1$,
 $13^2 11^2 5^2 1^1$, $13^3 7^1 5^1 3^2 1^2$, $13^3 7^2 5^1 1^1$, $13^3 9^1 5^1 3^2$, $13^3 11^1 7^1 1^2$, $13^3 11^1 9^1$,
 $13^4 5^1 1^2$, $15^1 9^2 7^2 5^1 3^2 1^1$, $15^1 9^3 7^1 5^1 3^1 1^2$, $15^1 9^4 5^1 3^1$, $15^1 11^1 9^1 7^3 3^1$,
 $15^1 11^1 9^2 7^1 3^2 1^2$, $15^1 11^1 9^2 7^2 1^1$, $15^1 11^1 9^3 3^2$, $15^1 11^2 7^1 5^2 3^1 1^2$,
 $15^1 11^2 9^1 5^2 3^1$, $15^1 11^3 5^1 3^2$, $15^1 11^4$, $15^1 13^1 9^1 7^2 5^1 3^1$, $15^1 13^1 9^2 5^1 3^2 1^2$,
 $15^1 13^1 9^2 7^1 5^1 1^1$, $15^1 13^1 11^1 7^2 3^2$, $15^1 13^1 11^1 9^1 7^1 3^1 1^1$, $15^1 13^1 11^1 9^2 1^2$,
 $15^1 13^2 7^1 5^1 3^2$, $15^1 13^2 9^1 5^1 3^1 1^1$, $15^1 13^2 11^1 3^2 1^1$, $15^1 13^2 11^1 7^1$, $15^1 13^3 5^1$,
 $15^2 7^3 5^1 3^1$, $15^2 9^1 7^1 5^1 3^2 1^2$, $15^2 9^1 7^2 5^1 1^1$, $15^2 9^2 5^1 3^2$, $15^2 11^1 7^2 3^1 1^1$,
 $15^2 11^1 9^1 7^1 1^2$, $15^2 11^1 9^2$, $15^2 13^1 7^1 5^1 3^1 1^1$, $15^2 13^1 9^1 5^1 1^2$, $15^2 13^1 11^1 3^1 1^2$,
 $15^3 7^1 5^1 1^2$, $15^3 9^1 5^1$, $15^3 11^1 3^1$, $17^1 9^2 7^3 3^1$, $17^1 9^3 7^1 3^2 1^2$, $17^1 9^3 7^2 1^1$,
 $17^1 9^4 3^2$, $17^1 11^1 7^2 5^2 3^2 1^1$, $17^1 11^1 7^3 5^2$, $17^1 11^1 9^1 7^1 5^2 3^1 1^2$, $17^1 11^1 9^2 5^2 3^1$,
 $17^1 11^2 7^1 5^1 3^2 1^2$, $17^1 11^2 7^2 5^1 1^1$, $17^1 11^2 9^1 5^1 3^2$, $17^1 11^3 7^1 1^2$, $17^1 11^3 9^1$,
 $17^1 13^1 7^3 3^2 1^2$, $17^1 13^1 7^4 1^1$, $17^1 13^1 9^1 7^2 3^2$, $17^1 13^1 9^2 7^1 3^1 1^1$, $17^1 13^1 9^3 1^2$,
 $17^1 13^1 11^1 5^2 3^2 1^2$, $17^1 13^1 11^1 7^1 5^2 1^1$, $17^1 13^1 11^2 5^1 1^2$, $17^1 13^2 7^2 1^2$,
 $17^1 13^2 9^1 3^2 1^1$, $17^1 13^2 9^1 7^1$, $17^1 13^3 3^1$, $17^1 15^1 7^3 3^2$, $17^1 15^1 9^1 7^2 3^1 1^1$,
 $17^1 15^1 9^2 7^1 1^2$, $17^1 15^1 9^3$, $17^1 15^1 11^1 5^2 3^2$, $17^1 15^1 11^2 5^1$, $17^1 15^1 13^1 7^1 3^2 1^1$,
 $17^1 15^1 13^1 7^2$, $17^1 15^1 13^1 9^1 3^1 1^2$, $17^1 15^1 13^2 1^1$, $17^1 15^2 7^1 3^1 1^2$, $17^1 15^2 9^1 3^1$,
 $17^2 7^1 5^2 3^2 1^2$, $17^2 7^2 5^2 1^1$, $17^2 9^1 5^2 3^2$, $17^2 11^1 7^1 5^1 1^2$, $17^2 11^1 9^1 5^1$, $17^2 11^2 3^1$,
 $17^2 13^1 5^2 1^2$, $17^2 15^1 5^2$, $17^3 5^1 3^1$, $19^1 7^4 5^1 3^2 1^1$, $19^1 7^5 5^1$, $19^1 9^1 7^3 5^1 3^1 1^2$,
 $19^1 9^2 7^2 5^1 3^1$, $19^1 9^3 5^1 3^2 1^2$, $19^1 9^3 7^1 5^1 1^1$, $19^1 11^1 7^3 3^2 1^2$, $19^1 11^1 7^4 1^1$,
 $19^1 11^1 9^1 7^2 3^2$, $19^1 11^1 9^2 7^1 3^1 1^1$, $19^1 11^1 9^3 1^2$, $19^1 11^2 5^2 3^2 1^2$, $19^1 11^2 7^1 5^2 1^1$,
 $19^1 11^3 5^1 1^2$, $19^1 13^1 7^2 5^1 3^2 1^2$, $19^1 13^1 7^3 5^1 1^1$, $19^1 13^1 9^1 7^1 5^1 3^2$,
 $19^1 13^1 9^2 5^1 3^1 1^1$, $19^1 13^1 11^1 5^3 1^1$, $19^1 13^1 11^1 7^2 1^2$, $19^1 13^1 11^1 9^1 3^2 1^1$,
 $19^1 13^1 11^1 9^1 7^1$, $19^1 13^2 7^1 5^1 1^2$, $19^1 13^2 9^1 5^1$, $19^1 13^2 11^1 3^1$, $19^1 15^1 7^2 5^1 3^2$,
 $19^1 15^1 9^1 7^1 5^1 3^1 1^1$, $19^1 15^1 9^2 5^1 1^2$, $19^1 15^1 11^1 7^1 3^2 1^1$, $19^1 15^1 11^1 7^2$,
 $19^1 15^1 11^1 9^1 3^1 1^2$, $19^1 15^1 13^1 5^1 3^2 1^1$, $19^1 15^1 13^1 7^1 5^1$, $19^1 15^2 5^1 3^1 1^2$,
 $19^1 17^1 5^3 3^2 1^2$, $19^1 17^1 7^1 5^3 1^1$, $19^1 17^1 7^3 1^2$, $19^1 17^1 9^1 7^1 3^2 1^1$, $19^1 17^1 9^1 7^2$,
 $19^1 17^1 9^2 3^1 1^2$, $19^1 17^1 11^1 5^2 1^2$, $19^1 17^1 13^1 3^3 1^1$, $19^1 17^1 13^1 7^1 1^3$,
 $19^1 17^1 15^1 3^1 1^5$, $19^2 5^4 1^1$, $19^2 7^2 5^1 1^2$, $19^2 9^1 5^1 3^2 1^1$, $19^2 9^1 7^1 5^1$, $19^2 11^1 3^3 1^1$,
 $21^1 7^4 5^1 3^1 1^2$, $21^1 9^1 7^3 5^1 3^1$, $21^1 9^2 7^1 5^1 3^2 1^2$, $21^1 9^2 7^2 5^1 1^1$, $21^1 9^3 5^1 3^2$,
 $21^1 11^1 7^3 3^2$, $21^1 11^1 9^1 5^3 3^1$, $21^1 11^1 9^1 7^2 3^1 1^1$, $21^1 11^1 9^2 7^1 1^2$, $21^1 11^1 9^3$,
 $21^1 11^2 5^2 3^2$, $21^1 11^3 5^1$, $21^1 13^1 7^2 5^1 3^2$, $21^1 13^1 9^1 7^1 5^1 3^1 1^1$, $21^1 13^1 9^2 5^1 1^2$,
 $21^1 13^1 11^1 7^1 3^2 1^1$, $21^1 13^1 11^1 7^2$, $21^1 13^1 11^1 9^1 3^1 1^2$, $21^1 13^2 5^1 3^2 1^1$,

$21^1 13^2 7^1 5^1, 21^1 15^1 5^4 3^1, 21^1 15^1 7^2 5^1 3^1 1^1, 21^1 15^1 9^1 7^1 5^1 1^2, 21^1 15^1 9^2 5^1,$
 $21^1 15^1 11^1 3^4, 21^1 15^1 11^1 7^1 3^1 1^2, 21^1 15^1 11^1 9^1 1^3, 21^1 15^1 13^1 5^1 3^1 1^2,$
 $21^1 17^1 5^3 3^2, 21^1 17^1 7^2 3^2 1^1, 21^1 17^1 7^3, 21^1 17^1 9^1 3^4, 21^1 17^1 9^1 7^1 3^1 1^2,$
 $23^1 5^6 3^2, 23^1 7^2 5^3 3^2 1^1, 23^1 7^3 5^3, 23^1 7^4 3^2 1^2, 23^1 7^5 1^1, 23^1 9^1 7^1 5^3 3^1 1^2,$
 $23^1 9^1 7^3 3^2, 23^1 9^2 5^3 3^1, 23^1 9^2 7^2 3^1 1^1, 23^1 9^3 7^1 1^2, 23^1 9^4, 23^1 11^1 5^5,$
 $23^1 11^1 7^1 5^2 3^2 1^2, 23^1 11^1 7^2 5^2 1^1, 23^1 11^1 9^1 5^2 3^2, 23^1 11^2 7^1 5^1 1^2, 23^1 11^2 9^1 5^1,$
 $23^1 11^3 3^1, 23^1 13^1 5^3 3^2 1^2, 23^1 13^1 7^1 5^3 1^1, 23^1 13^1 7^2 3^3, 23^1 13^1 7^3 1^2,$
 $23^1 13^1 9^1 7^1 3^2 1^1, 23^1 13^1 9^2 3^1 1^2, 23^1 13^1 11^1 5^2 1^2, 25^1 7^1 5^4 3^2 1^1, 25^1 7^2 5^4,$
 $25^1 7^3 5^1 3^2 1^2, 25^1 7^4 5^1 1^1, 25^1 9^1 5^4 3^1 1^2, 25^1 9^1 7^2 5^1 3^2, 25^1 9^2 5^1 3^3 1^2,$
 $25^1 9^2 7^1 5^1 3^1 1^1, 27^1 5^1 3^9, 27^1 5^4 3^4, 29^1 1^{30}$

60: $10^3 8^2 6^2 2^1, 10^3 8^3 6^1, 10^4 6^2 4^2, 10^4 8^1 4^2 2^2, 10^5 6^1 4^1, 10^6,$
 $12^1 10^1 8^2 6^2 4^2 2^1, 12^1 10^2 8^2 6^1 4^1 2^1, 12^1 10^2 8^3 4^1, 12^1 10^3 8^1 6^1 2^2,$
 $12^1 10^3 8^2 2^1, 12^1 10^4 4^2, 12^2 8^3 6^2, 12^2 8^4 2^2, 12^2 10^1 8^2 4^2 2^1, 12^2 10^2 6^2 4^1,$
 $12^2 10^2 8^1 4^1 2^2, 12^2 10^3 6^1, 12^3 8^2 6^1 2^1, 12^3 10^1 6^1 4^2, 12^3 10^2 4^1, 12^4 6^2,$
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 $24^1 12^3, 26^1 6^1 4^6 2^2, 26^1 6^3 4^3 2^2, 26^1 6^5 2^2, 26^1 8^1 4^6 2^1, 26^1 8^1 6^2 4^3 2^1,$
 $26^1 8^1 6^4 2^1, 26^1 8^2 6^1 4^3, 26^1 8^2 6^3, 26^1 8^3 2^5, 28^1 4^2 2^{12}, 28^1 4^5 2^6, 28^1 4^8$

References

- [1] C.J. Colbourn, C.A. Cusack and D.L. Kreher, "Partial Steiner triple systems with equal-sized holes", preprint, 1992.
- [2] C.J. Colbourn, D.G. Hoffman, R. Rees, A new Class of Group Divisible Designs with Block Size Three, *Journal of Combinatorial Theory A* 59 (1992) 73-89.
- [3] C.J. Colbourn and A. Rosa, "Leaves, excesses and neighbourhoods in triple systems", *Austral. J. Comb.* 4 (1991) 143-178.
- [4] D.R. Stinson, "Hill-climbing algorithms for the construction of combinatorial designs", *Ann. Discrete Math.* 26 (1985) 321-334.