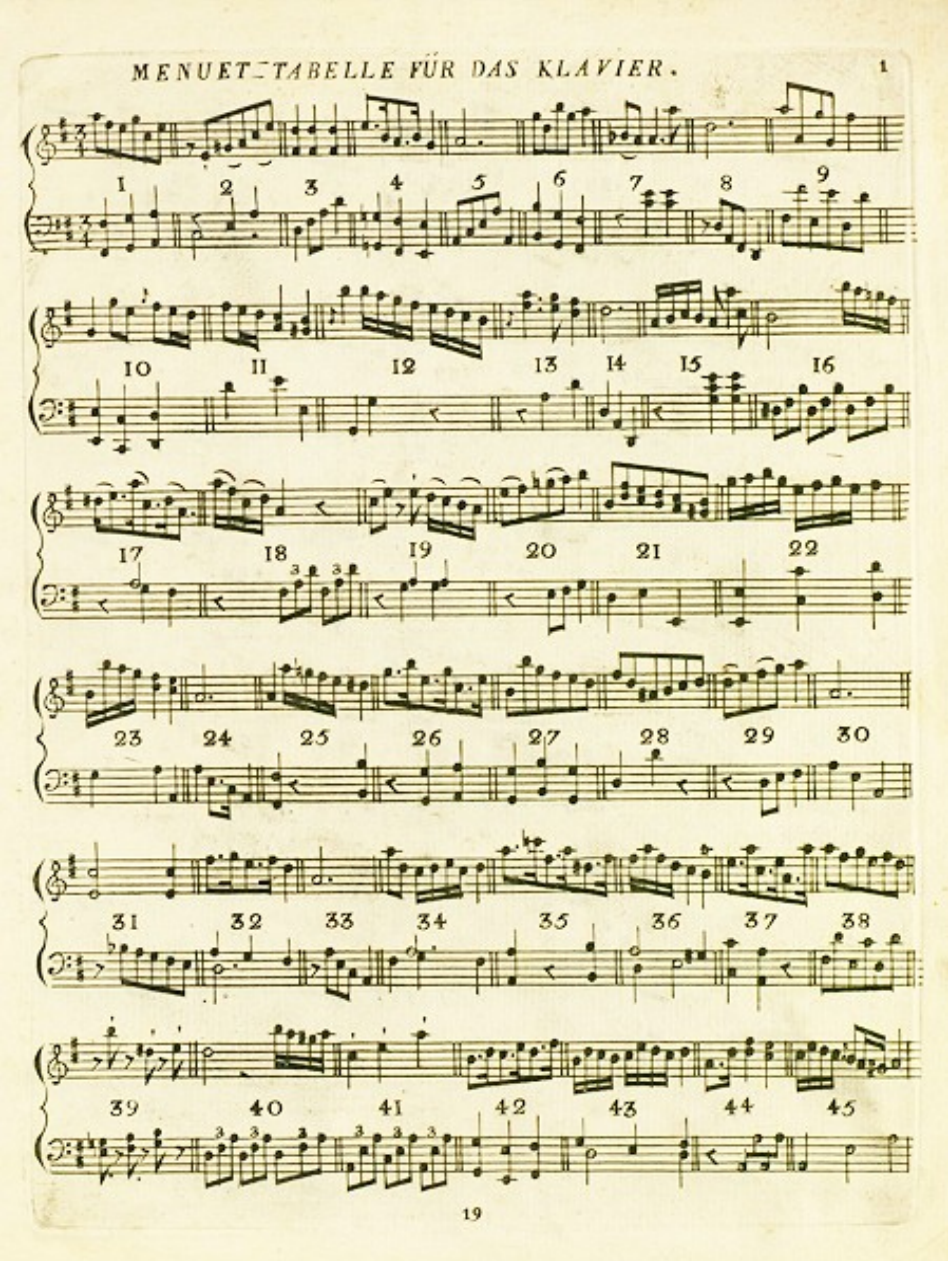
Wonders of the Musical World Series 4

Musical Dice Game Waltzes I

based on

Table pour composer des minuets et des Trios à la infinie; avec deux dez à jouer (1780)
by Maximilian Stadler

compiled by I. T. Author



Libre Edition Press

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by Maximilian Stadler

Author:
I. T. Author

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Dr. Communio Sanctorum

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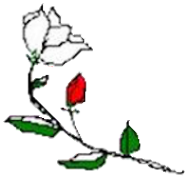

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1 Introduction[1]

The cover page of a German version of the Musical Dice Game (MDG) attributed to Franz Joseph Haydn (1732-1809) opens with the words:

"Tabelle,	"Table,
aus welcher man unzählige	from which you can create (roll out) countless
Menuetten und Trio	minuets and trios
für das Klavier herauswürfeln kann	for the piano
verfaßt von P. Maximilian Stadler"	written by P. Maximilian Stadler".

while a corresponding Italian version has the following words:

"GIOCO FILARMONICO	"PHILHARMONIC GAME
O SIA MANIERA FACILE PER COMPORRE UN INFINITO NUMERO DI MINUETTI E TRIO, ANCHE SENZA SAPERE IL CONTRAPUNTO"	OR BE IT AN EASY WAY TO COMPOSE AN INFINITE NUMBER OF MINUETS AND TRIOS, EVEN WITHOUT KNOWING COUNTERPOINT"

Indeed, this particular MDG allows a non-professional musician to generate ("compose") as nearly as 35.7 octillions of unique minuet-trios (more precisely,

$$(11^{14}) \times (10^2) \times (6^{14} \times 4 \times 3) = 35,710,533,929,214,947,279,418,163,200;$$

see additional explanation in Subsection 2.2).

A *Musikalisches Würfelspiel* (German for "musical dice game" or MDG) is a system for randomly "generating" (e.g., by using a die or two dice) musical compositions from precomposed options and was quite popular throughout Western Europe in the 18th century. The earliest known MDG is Johann Philipp Kirnberger's *Der allezeit fertige Menuetten und Polonaisencomponist (1st ed. 1757; rev. 2nd ed. 1783)* (translated from German as "The Ever-Ready Minuet and Polonaise Composer"). Other well-known composers that are to known to have composed a MDG are C.P.E. Bach (*Einfall, einen doppelten Contrapunct in der Octave von sechs Tacten zu machen, ohne die Regeln davon zu wissen (1758)*; translated from German as "A method for making six bars of double counterpoint at the octave without knowing the rules") and *Musikalisches Würfelspiel K. 516f (1787)*, the most famous of MDGs, that was first published by J.J. Hummel in 1793 in Berlin, and was republished in 1796 by Nikolaus Simrock in Bonn (as K. 294d or K. Anh. C 30.01). Simrock attributed this work, which is also known under the title of *Anleitung zum Componieren von Walzern so viele man will vermittelst zweier Würfel, ohne etwas von der Musik oder Composition zu verstehen* (German for "Instructions for the composition of as many waltzes as one desires with two dice, without understanding anything about music or composition"), to Wolfgang Amadeus Mozart and it may have been based on Mozart's manuscript K. 516f, written in 1787, consisting of numerous two-bar fragments of music, that appear to be some kind of game or system for constructing music out of two-bar fragments, but contains no instructions nor hints as to the use of dice. An online article by Hideo Noguchi offers a possible explanation for this attribution.

The MDG featured in this book, *Table pour composer des minuets et des Trios à la infinie; avec deux dez à jouer* (translated from French as "A table for composing minuets and trios to infinity, by playing with two dice") was first published in Germany by Abbé Maximillian Stadler in 1780. It was also published in Italy with the title given above. From here onwards, we simply refer to this MDG as *Gioco Filarmonico* or *Tabelle*.

[1]The information contained in the introduction were culled from the following online resources: **?**, `https://opus-infinity.org/`, and Mozart Studies Online.

This book is a collection of 28 MDG minuet-trios generated according to the rules given in *Gioco Filarmonico/ Tabelle*. The scores of the generated minuet-trios, that were initially written in using the `abc` environment of Chris Walshaw, were converted to Scalar Vector Graphics (SVG) images (with corresponding MIDIs) and were then pre-processed with Inkscape to be included in LaTeX to produce this book.

2 *Gioco Filarmonico/ Tabelle*

2.1 Rules

The Rules provided in *Gioco Filarmonico/ Tabelle* generate MDGs that are minuet-trios, each consisting of a 16-bar minuet and a 16-bar trio. The minuet is first played then the trio. The minuet is played eight (8) bars at at time, each 8-bar set being repeated each time. The consequent trio is similarly played, eventually yielding a total of 64 played measures (or bars).

The following Rules are followed for generating each minuet:

1. For each bar from the first to the 16th, two dice are tossed and the sum of the two faces that come up are obtained. Hence, 16 two-dice tosses (with possible outcomes from the set {2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}, one two-dice toss for each bar, are needed to generate a minuet.

2. Table 1(a) is then used to determine which bar number from the Table of Measures for Minuets (Figures 1 to 3) is to be used for obtaining the notes—based on the outcome of each two-dice toss—for the particular bar of the minuet-to-be-generated. The possible outcomes of a two-dice toss (2 to 12) are given (stub items) on the left-hand side of Table 1, while the bar numbers of the minuet-to-be-generated are given on the top of that table (captions or column headings).

3. For example, suppose for bar 1, the outcome of the two-dice toss is 5. If we now look for bar number 1 at the top of Table 1 and for the outcome 5 on the left-hand side of that table, we obtain 40 as the measure number of the Table of Measures for Minuets (see Figure 1) to be used for obtaining the notes to be played for the first bar of the minuet-to-be-generated. Similarly, an outcome of 11 for the two-dice toss for bar 9 of the minuet-to-be-generated leads us to obtain the notes from bar 102 of the Table of Measures for Minuets (see Figure 2).

The following Rules are followed for generating each trio:

1. For each bar of the trio, from the first bar to the 16th, a die is tossed. Hence, 16 one-die tosses with possible outcomes from the set {1, 2, 3, 4, 5, 6}, a toss of a die for each bar, are needed to generate a trio.

2. Table 1(b) is then used to determine which bar number from the Table of Measures (Figures 4 to 5) is to be used for obtaining the notes, based on the outcome of each die toss, for the bar of the trio corresponding to that one-die toss . The possible outcomes of a toss of a die (1 to 6) are given (stub items) on the left-hand side of Table 1(b), while the measure numbers of the minuet-to-be-generated are given on the top of that table (captions or column headings).

3. For example, suppose for bar 1, the outcome of the one-die toss is 5. If we now look for measure number 1 at the top of Table 1 and for the outcome 5 on the left-hand side of that table, we obtain 83 as the bar number of the Table of Measures for Trios (see Figure 5) to be used for obtaining the notes to be played for the first measure of the trio-to-be-generated. Similarly, an outcome of 1 on the one-die toss for bar 9 of the trio-to-be-generated leads us to obtain the notes from bar 36 of the Table of Measures for Trios (see Figure4 4) .

2.2 Table for finding Measure Number from Table of Measures

The table given here (Table 1) combines the four (4) tables, two at a time, given on page 2 of *Gioco Filarmonico* (also on pp. 11-12 of *Tabelle*) but the contents are exactly as given there. The leftmost column contains the possible two-dice outcomes while the topmost row contains the bar numbers ($16 + 16 = 32$ in all) for the MDG minuet-trio-to-be-generated.

(a) Measure Number of Minuet

Dice 1 + Dice 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2	96	22	141	41	105	122	11	**30**	70	121	26	9	112	49	109	14
3	32	6	128	63	146	46	134	81	117	39	126	56	174	18	116	83
4	69	95	158	13	153	55	110	24	66	139	15	132	73	58	145	79
5	40	17	113	85	161	2	159	100	90	176	7	34	67	160	52	170
6	148	74	163	45	80	97	36	107	25	143	64	125	76	136	1	93
7	104	157	27	167	154	68	118	91	138	71	150	29	101	162	23	**151**
8	152	60	171	53	99	133	21	127	16	155	57	175	43	168	89	**172**
9	119	84	114	50	140	86	169	94	120	88	48	166	51	115	72	111
10	98	142	42	156	75	129	62	**123**	65	77	19	82	137	38	149	8
11	3	87	165	61	135	47	147	33	102	4	31	164	144	59	173	78
12	54	130	10	103	28	37	106	5	35	20	108	92	12	124	44	131

(b) Measure Number of Trio

Dice 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	72	6	59	25	81	41	89	13	36	5	46	79	30	95	19	66
2	56	82	42	74	14	7	26	**71**	76	20	64	84	8	35	47	88
3	75	39	54	1	65	43	15	80	9	34	92	48	69	58	90	**21**
4	40	73	16	68	29	55	2	**61**	22	67	49	77	57	87	33	**10**
5	83	3	28	53	37	17	44	**70**	63	85	32	96	12	23	50	**91**
6	18	45	62	38	4	27	52	94	11	92	24	86	51	60	78	**31**

Table 1: Measure number to be looked-up in the Table of Measures (see Figures 1, 2, 3, 4, and 5 in Section 2.3) corresponding to each two-dice outcome per measure for the minuet and one-die outcome for the trio. Measure number in **bold blue font** indicates identical measures under that column (see https://opus-infinity.org for more info).

Although the body of Table 1(a) includes $11 \times 16 = 176$ measure numbers, the Table of Measures for Minuets (Figures 1 to 3) contains only 174 different measures. This is so since in Table 1, although 11 choices are listed below each column, two choices under bar 8 (choices 30 and 123) and also under bar 16 (choices 151 and 172)) lead to identical notes in the Table of Measures for Minuets, so that only 10 different bars are under each of these two (2) columns. Consequently, the total number of different measures for minuets is $11 \times 14 + 10 + 10 = 174$.

For the table for trios (Table 1(a)), $6 \times 16 = 96$ measure numbers are listed but there are only $6 \times 14 + 4 + 3 = 91$ unique measures. This is so since under the column for bar 8 for trios, choices 71, 61, and 70 lead to the same set of notes in the Table of Measures for Trios (Figures 4 to 5). Also, under column for bar 16 for trios, choices 21, 10, 91, and 31 also lead to the same set of notes in the Table of Measures for Trios.

2.3 Table of Measures

Gioco Filarmonico (Minuets)

[**from** http://imslp.org/wiki/Table_pour_composer_des_Minuets_et_des_Trios_%C3%A0_la_infinie_(Stadler,_Maximilian)]

attributed to Joseph Haydn

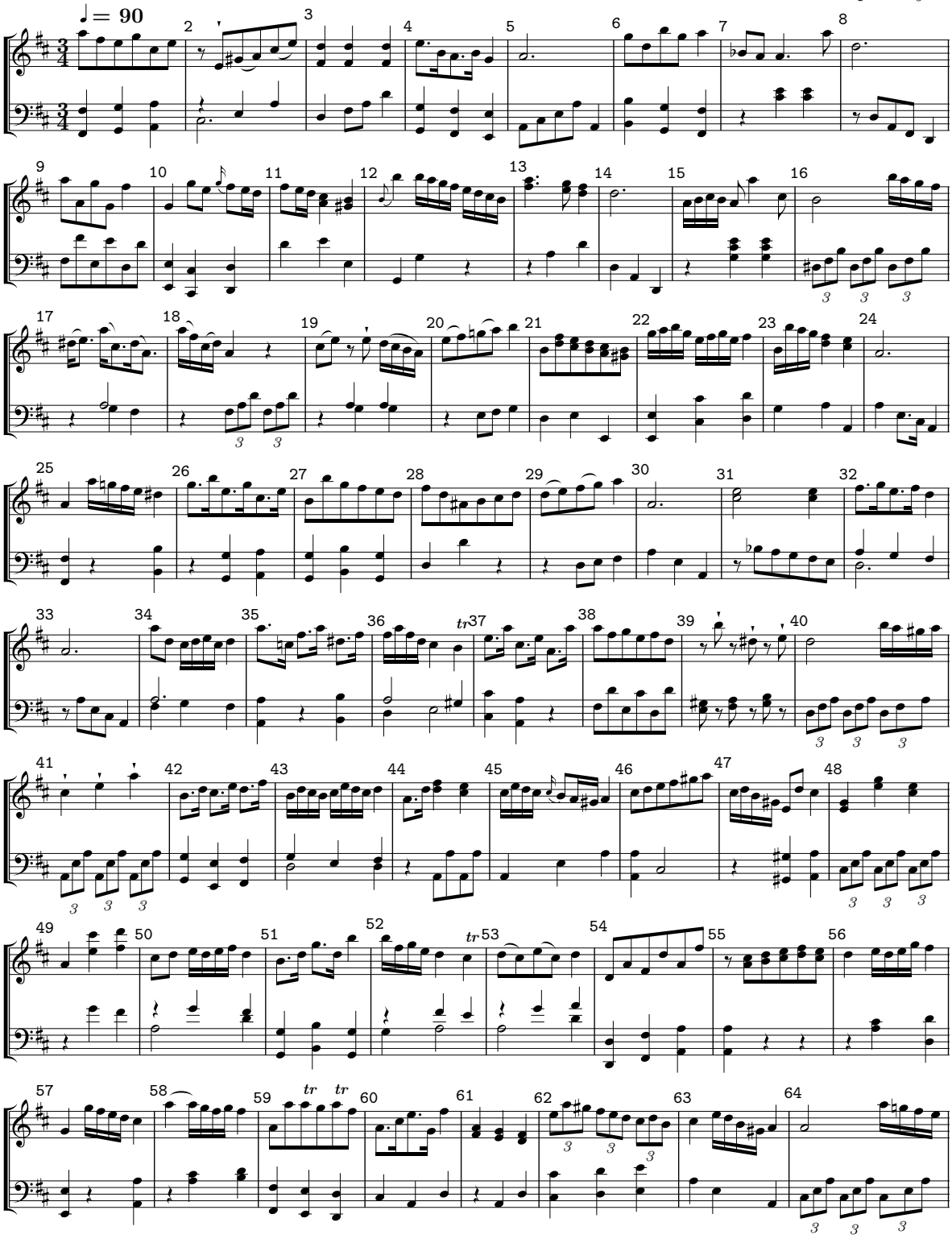

Figure 1: Table of Measures for Minuets (Part I)

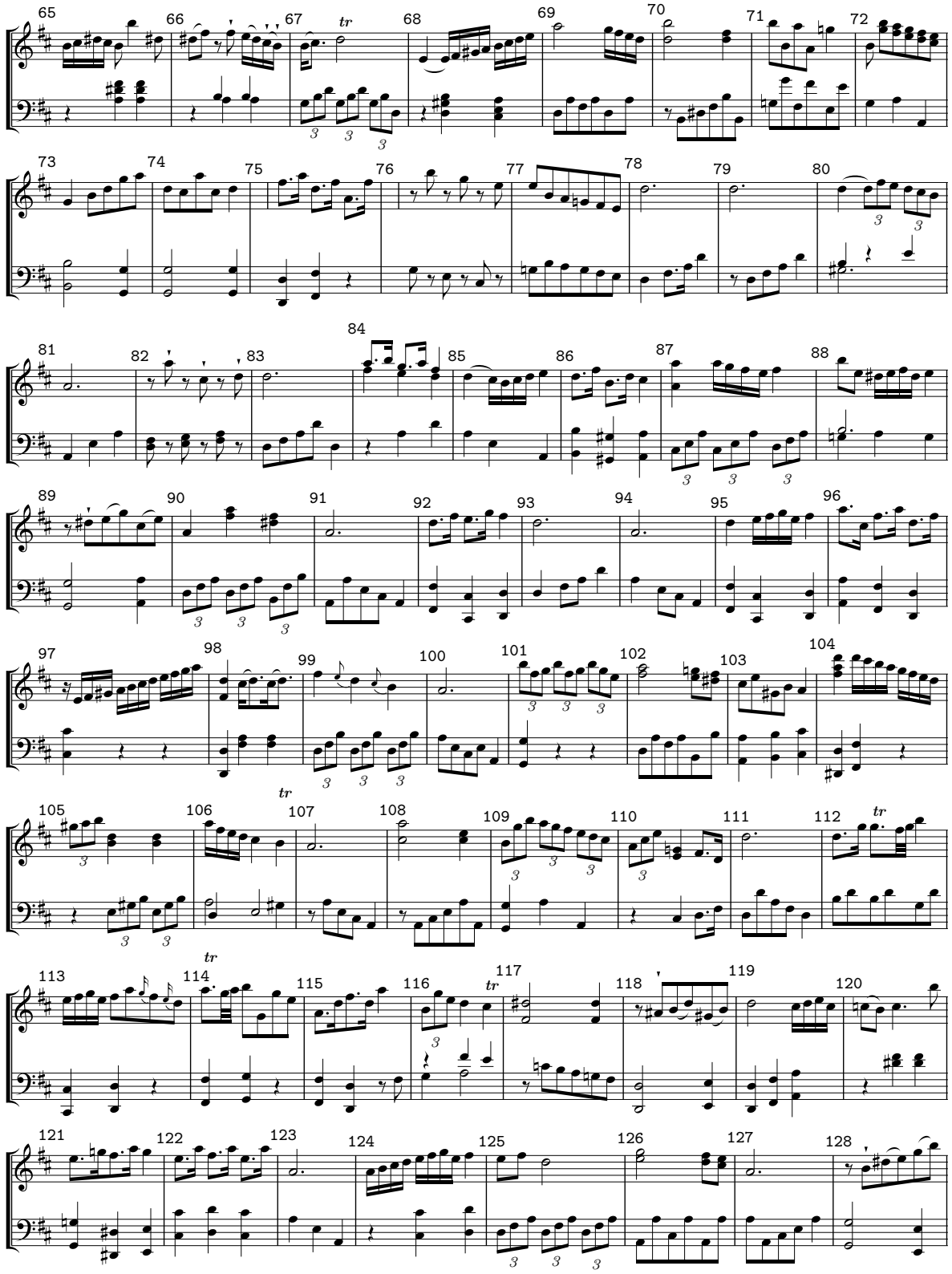

Figure 2: Table of Measures for Minuets (Part II)

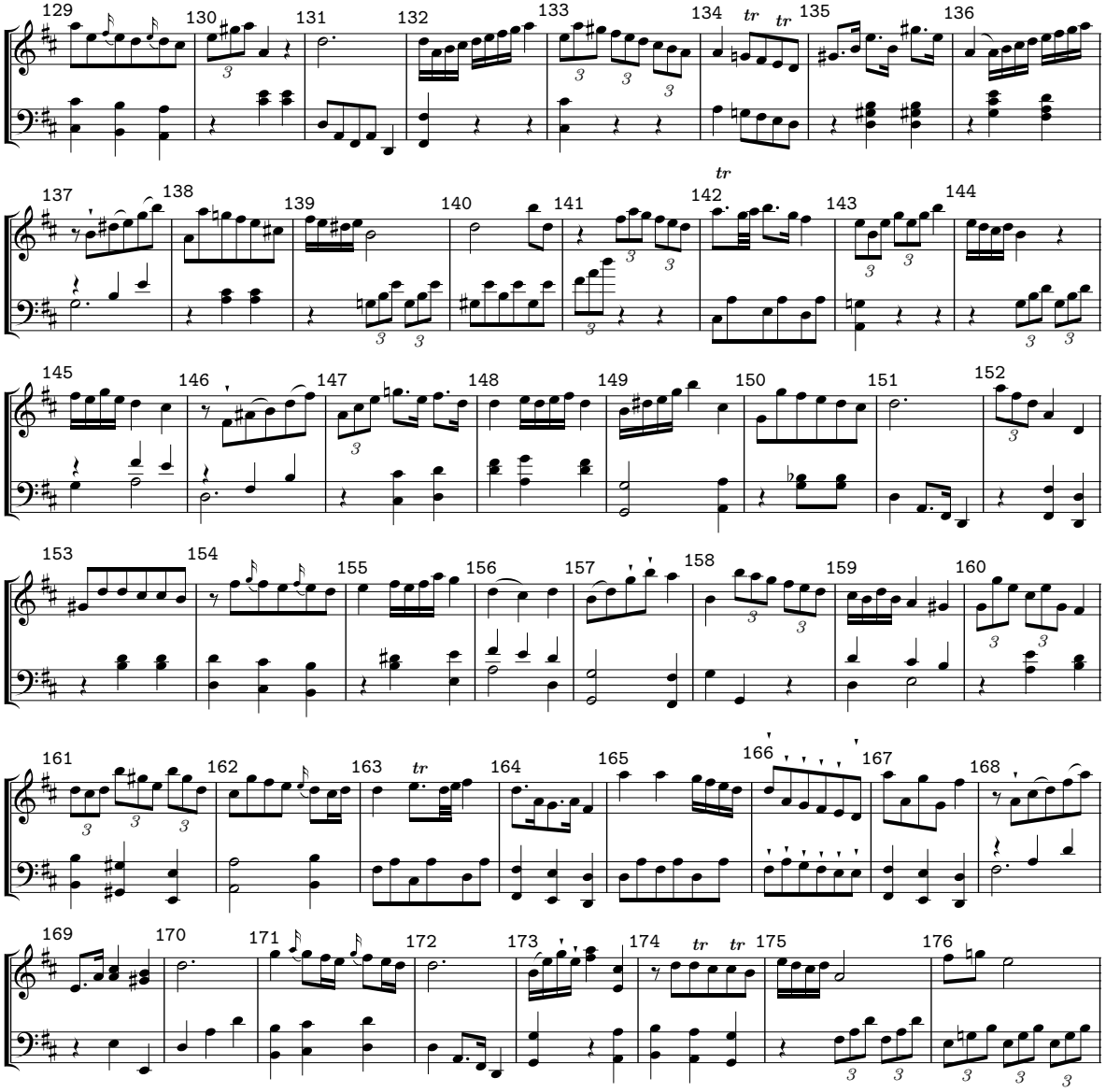

Figure 3: Table of Measures for Minuets (Part III)

Gioco Filarmonico (Trios)

[**from** http://imslp.org/wiki/Table_pour_composer_des_Minuets_et_des_Trios_%C3%A0_la_infinie_(Stadler,_Maximilian)]

attributed to Joseph Haydn

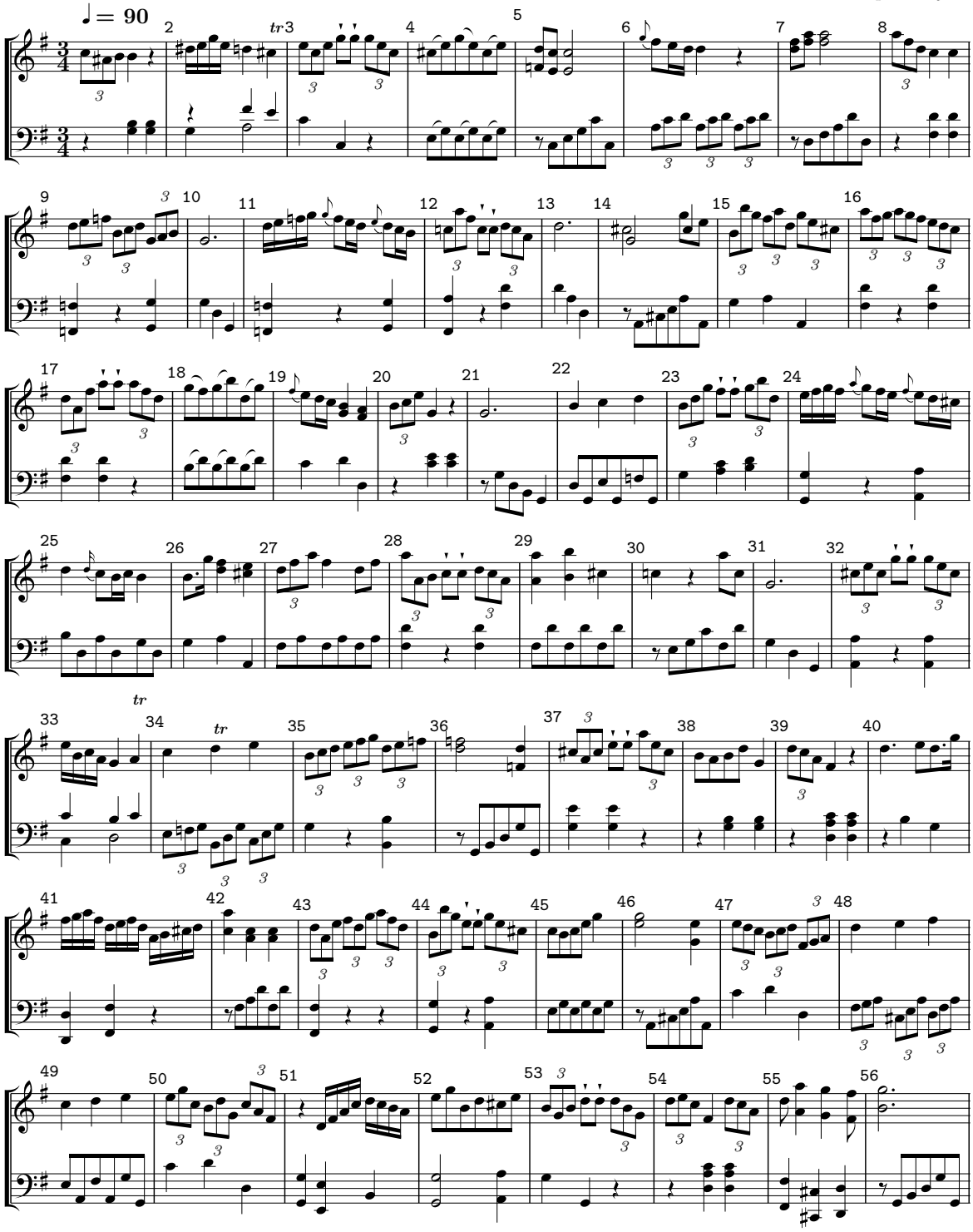

Figure 4: Table of Measures for Trios (Part IV)

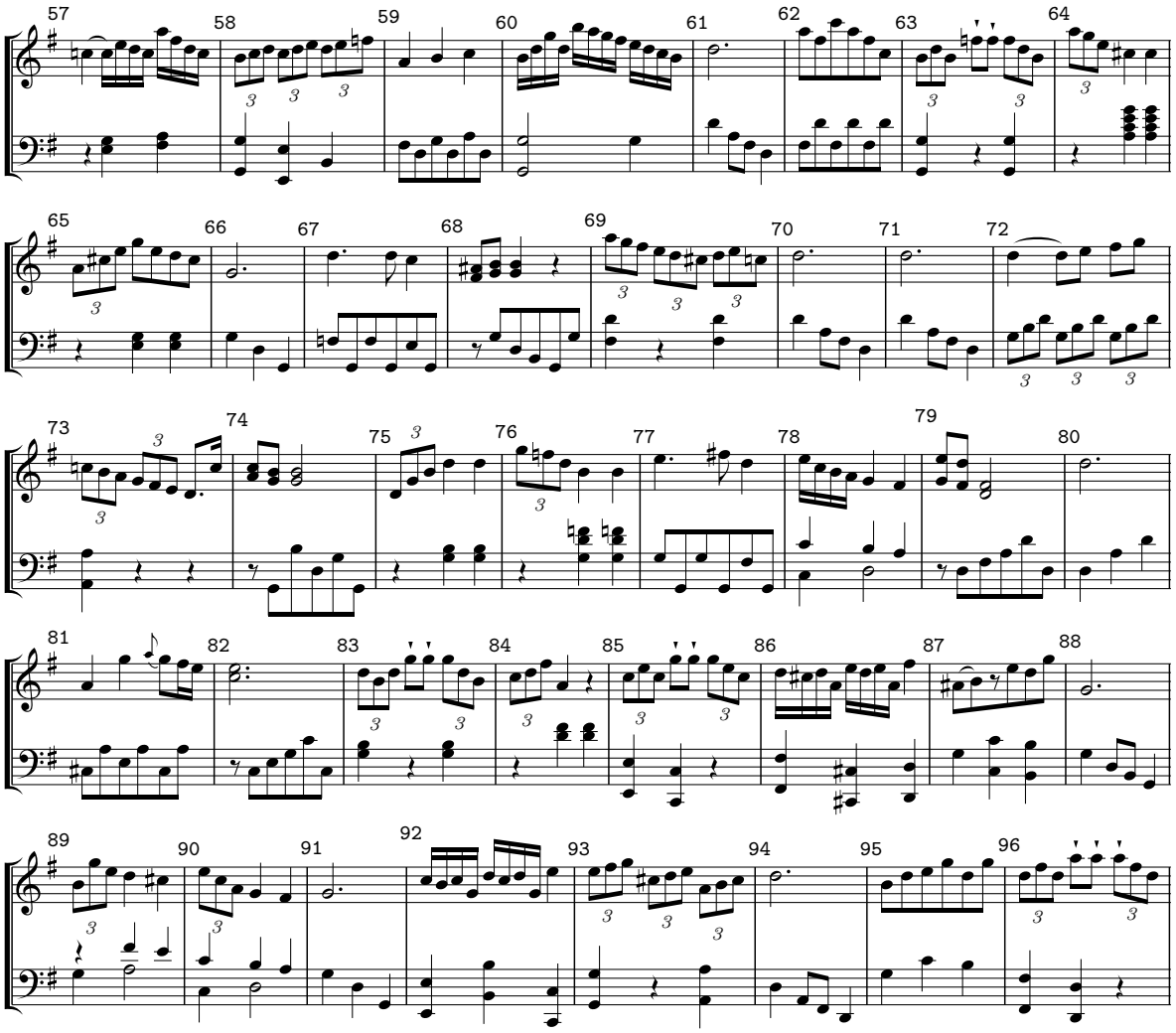

Figure 5: Table of Measures for Trios (Part V)

3 Related Links

The following are very interesting sites in that they allow the online rendering of MDGs:

- Opus Infinity - Collaborative work of Robbert Harms, Hein Moors, and Suus van Petegem whose goal is to unravel the mystery behind the tables used for generating MDGs. Site visitors can generate MDGs based on works of Kirnberger, Mozart, Stadler/Haydn, Bach, and Gerlach. Corresponding audio files (`mid, ogg,` and/or `mp3`) and image files (`pdf` or `png`) are also made available for listening, viewing, or downloading.
- Mozart - A site maintained by John Chuang that allows the site visitor to generate MDGs based on the work of Stadler/Haydn.
- Mozart - A site maintained by Marian Aldenhövel allows the visitor to generate a MDG (user-specified or randomly-generated) and the corresponding audio (`midi, wav`) and image files (`pdf, png`) based on *Musikalisches Würferspiel, K. 516f.*
- `mozart.zip` - This is a Windows software (© 1995 VisionSoft) by John Chuang and Stephen Goodwin that generates MDG based on input from user and is available for *free* from Amaranth Publishing.
- "Mozart - Musical Game in C K. 516f," Mozart Studies Online - The site of Hideo Noguchi that offers an explanation linking *Musikalisches Würferspiel, K. 516f*, and *K. 294d (K. Anh. C 30.01)*.

4 Acknowledgments

My sincerest gratitude to Chris Walshaw et al. for the ABC music notation; Jean-Francois Moine for `abcm2ps` and the accompanying examples, templates, and pointers for the appropriate use of these resources; Guido Gonzato for the ABC Plus Project and the `abcmidi` resources available there, more especially for the ABC resource book *Making Music with ABC 2*; James R. Allwright and Seymour Shlien for `abcmidi` source and binaries; Artifex, Inc. for Ghostscript v.10.00.0 (includes the `ps2pdf` converter); Inkscape v.1.2.2 for the tool for converting SVGs to PDFs for inclusion into LaTeX documents; William Schelter for Maxima v.5.47.0—used for computing the permutation number; and `User:Martin H` for his reply to a TeX/LaTeX Stack Exchange question on including SVGs into LaTeX documents. Special thanks also to the International Music Score Library Project (IMSLP) for making available the score for Table pour composer des Minuets et des Trios à la infinie and Amaranth Publishing for a copy of `mozart.zip`. Ditto to Machtelt Garrels for the book Bash Guide for Beginners, Vivek Gite for the book Linux Script Shell Tutorial, and Steve Parker for the Unix/Linux Shell Cheatsheet. John Fogarty's GitHub Site: Latex CreateSpace BookCover and Peter Wilson's reply in TeX/LaTeX Stack Exchange on designing a book cover, were sources of ideas, information, and materials for creating the book cover and title page, thanks to both of them; LibreOffice Calc for its use in the image creation of the book cover. Many thanks, too, to the Debian Project for the Debian 12 (Bookworm) GNU/Linux OS, TeXLive 2024 for providing the TeX distribution, and GitHub for its generosity in providing space for the project.

5 Selected Waltzes

10-4-8-6-4-9-10-5-4-10-3-4-5-7-12-2-5-5-4-3-2-4-2-5-4-5-5-1-5-2-1-5

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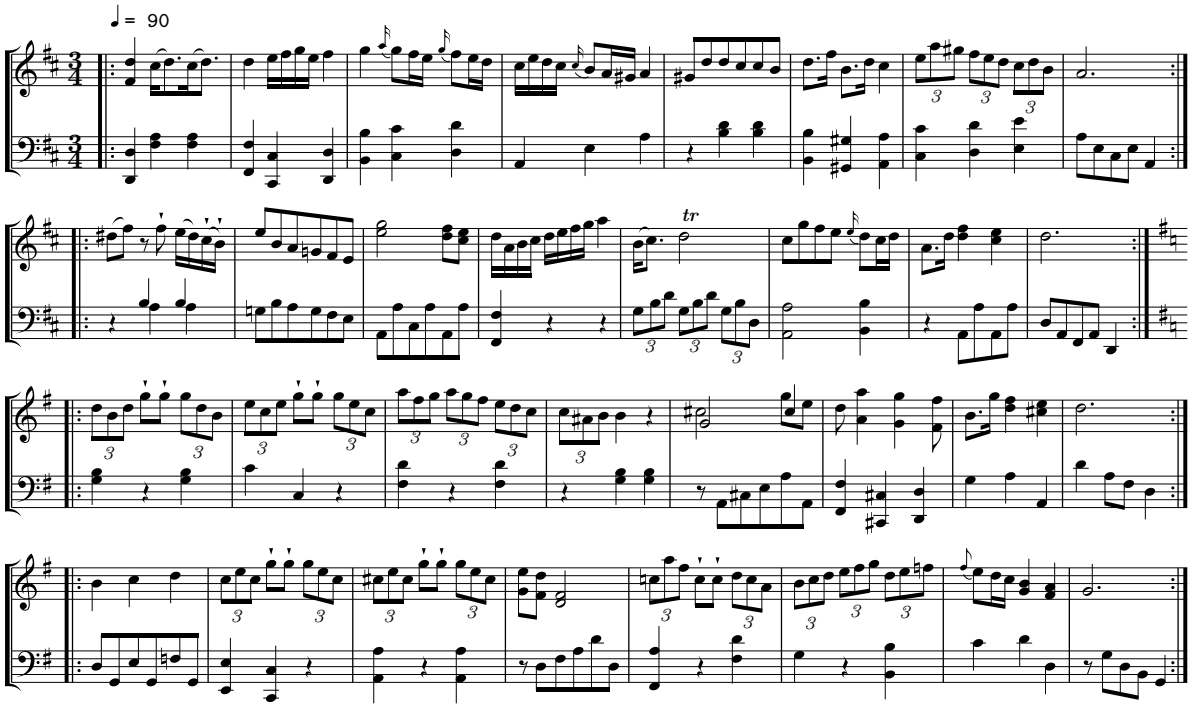

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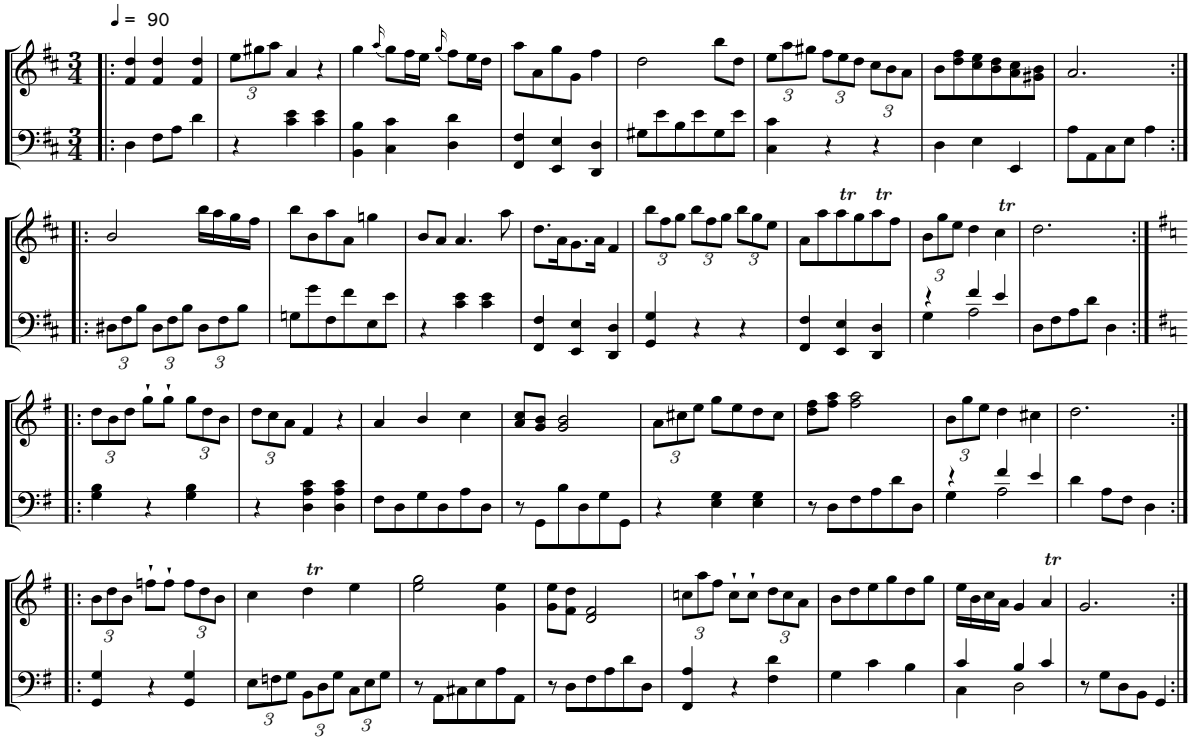
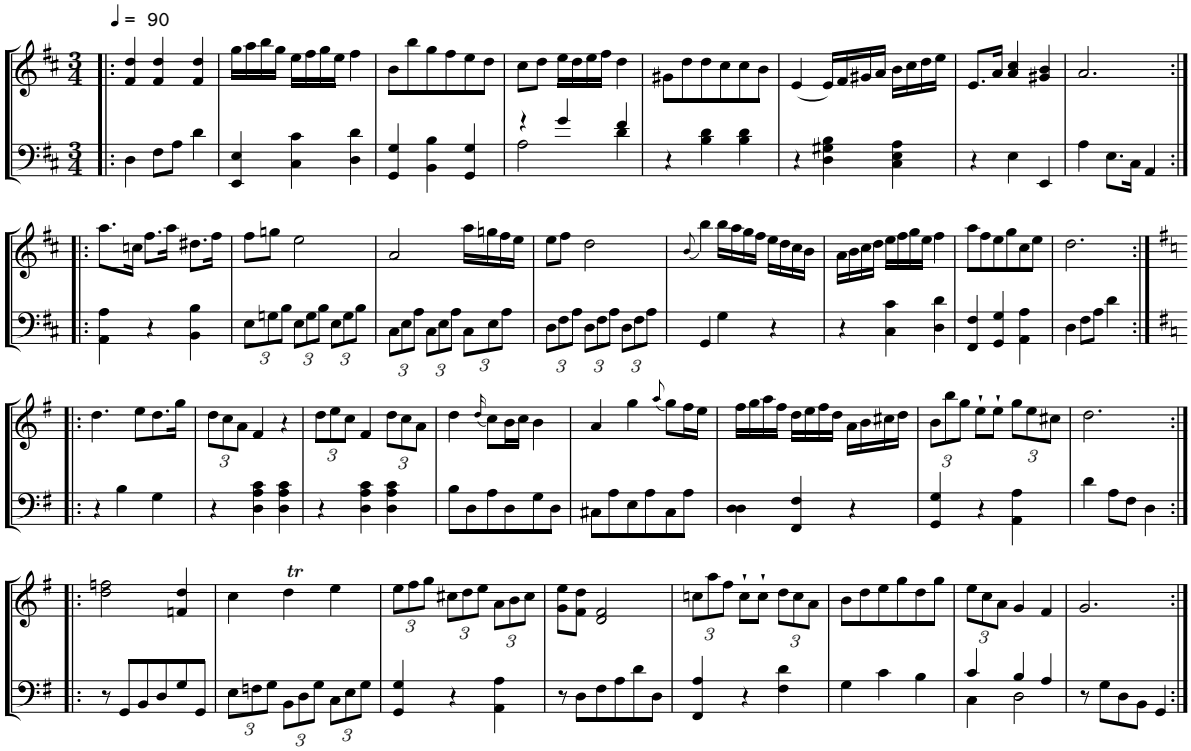


For audio (midi): gfmt-11-12-8-7-9-8-8-8-8-7-5-11-7-11-3-2-5-3-1-2-3-2-1-5-5-3-1-1-5-1-4-5.mid

11-2-7-9-4-7-9-4-12-5-6-6-12-12-6-6-4-3-3-1-1-1-5-4-1-3-3-1-5-1-3-4

gfmt::3:22:27:50:153:68:169:24:35:176:64:125:12:124:1:93:40:39:54:25:81:41:44:71:36:34:93:79:12:95:90:21::

Perm. No.: 279988847080968030199356485 28

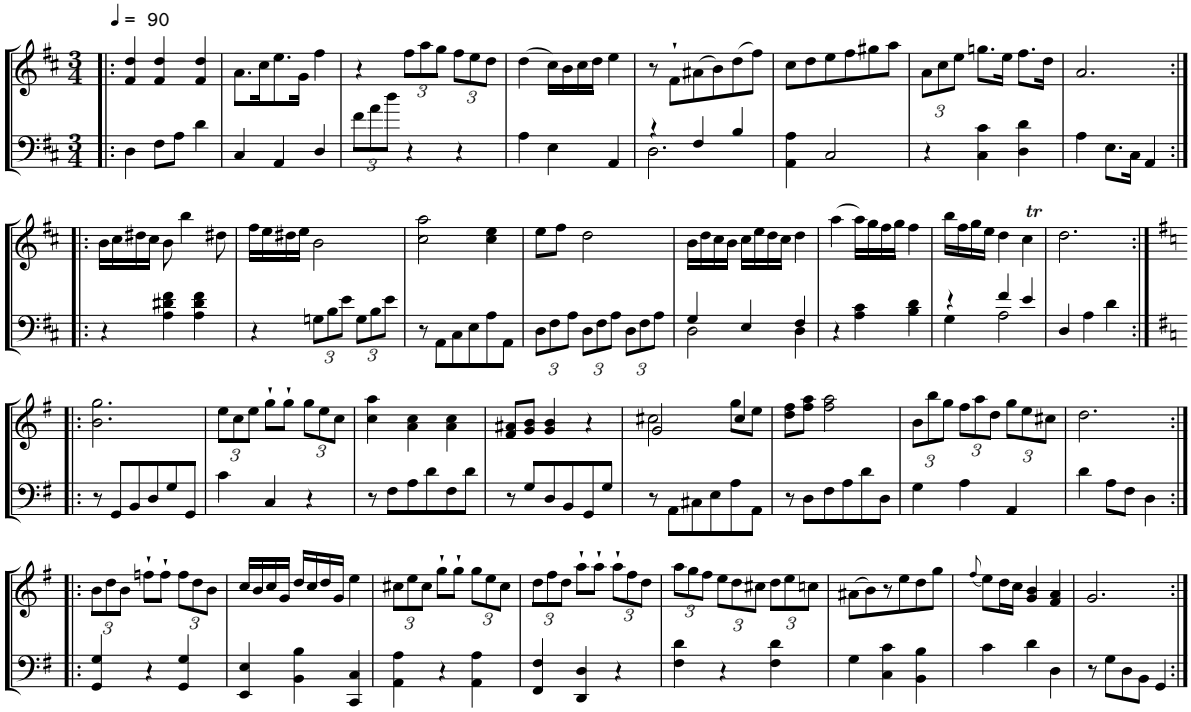


For audio (midi): gfmt-11-2-7-9-4-7-9-4-12-5-6-6-12-12-6-6-4-3-3-1-1-1-5-4-1-3-3-1-5-1-3-4.mid

11-8-2-5-3-3-11-4-10-4-12-6-8-4-5-11-2-5-2-4-2-2-3-4-5-6-5-5-3-4-1-3

gfmt::3:60:141:85:146:46:147:24:65:139:108:125:43:58:52:170:56:3:42:68:14:7:15:71:63:92:32:96:69:87:19:21::

Perm. No.: 249535223328276849935472033 82

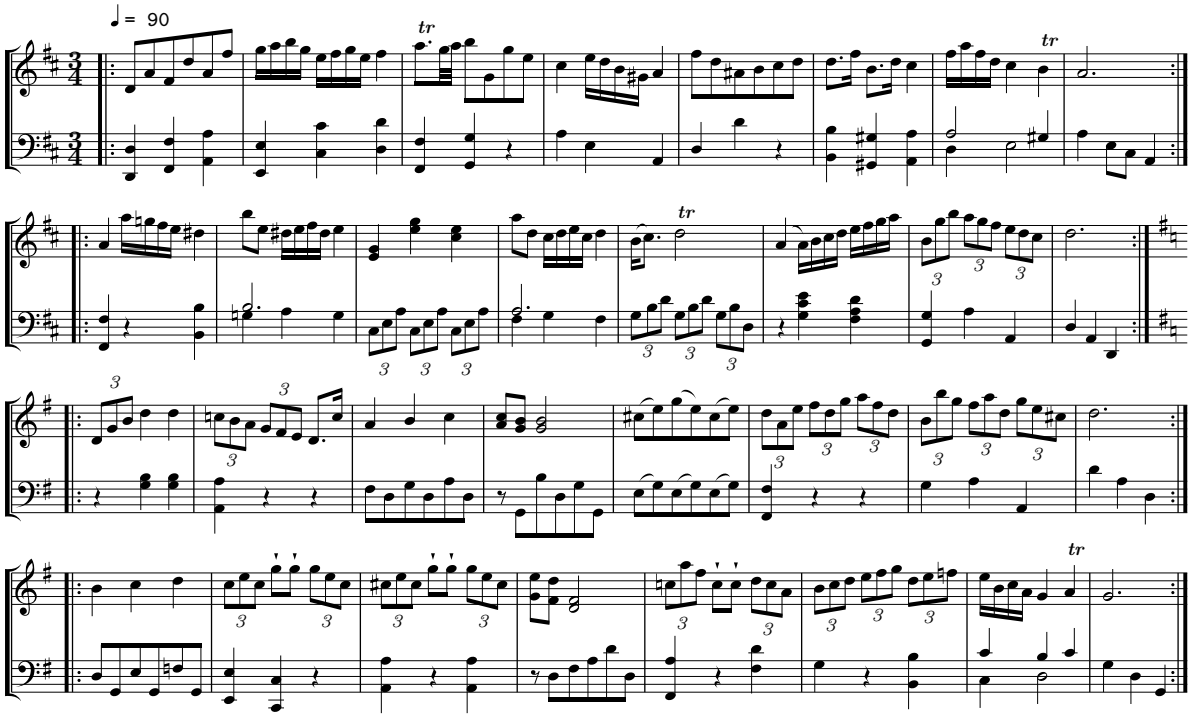


For audio (midi): gfmt-11-8-2-5-3-3-11-4-10-4-12-6-8-4-5-11-2-5-2-4-2-2-3-4-5-6-5-5-3-4-1-3.mid

12-2-9-3-12-9-6-9-6-9-9-5-5-6-2-6-3-4-1-2-6-3-3-1-4-5-5-1-5-2-4-1

gfmt::54:22:114:63:28:86:36:94:25:88:48:34:67:136:109:14:75:73:59:74:4:43:15:13:22:85:32:79:12:35:33:66::

Perm. No.: 651011983701493328452966 1717



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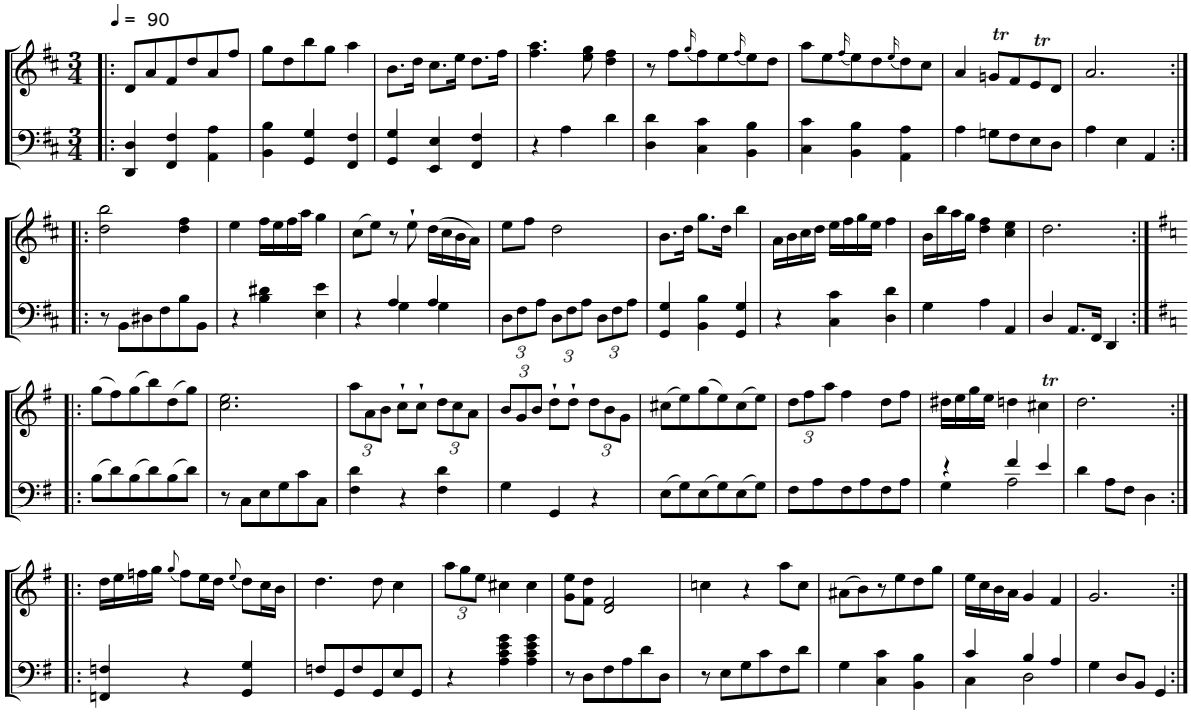
12-3-10-4-7-10-3-10-2-8-10-6-9-12-7-4-6-2-5-5-6-6-4-4-6-4-2-1-1-4-6-2

gfmt::54:06:42:13:154:129:134:123:70:155:19:125:51:124:23:151:18:82:28:53:4:27:2:71:11:67:64:79:30:87:78:88::

Perm. No.: 228175898640900960740629967 46



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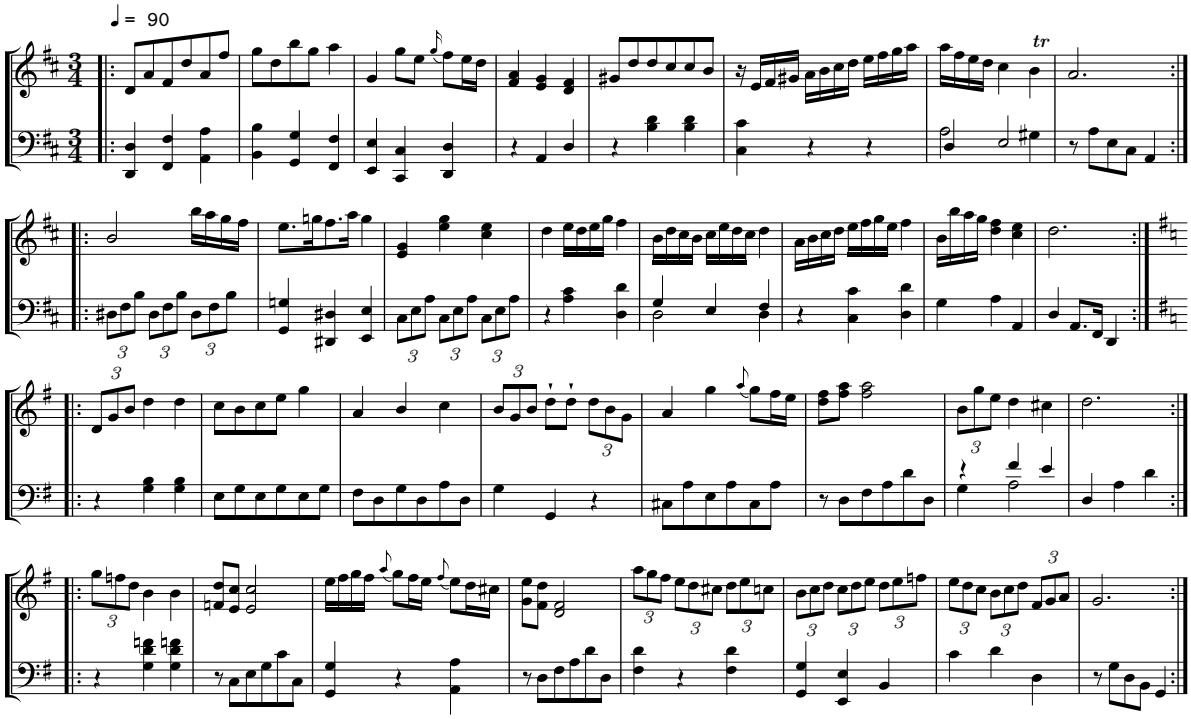
12-3-12-11-4-6-12-6-8-2-9-3-8-12-7-7-3-6-1-5-1-2-1-3-2-1-6-1-3-3-2-6

gfmt::54:06:10:61:153:97:106:107:16:121:48:56:43:124:23:151:75:45:59:53:81:7:89:80:76:5:24:79:69:58:47:21::

Perm. No.: 265701831717739808941660745 91



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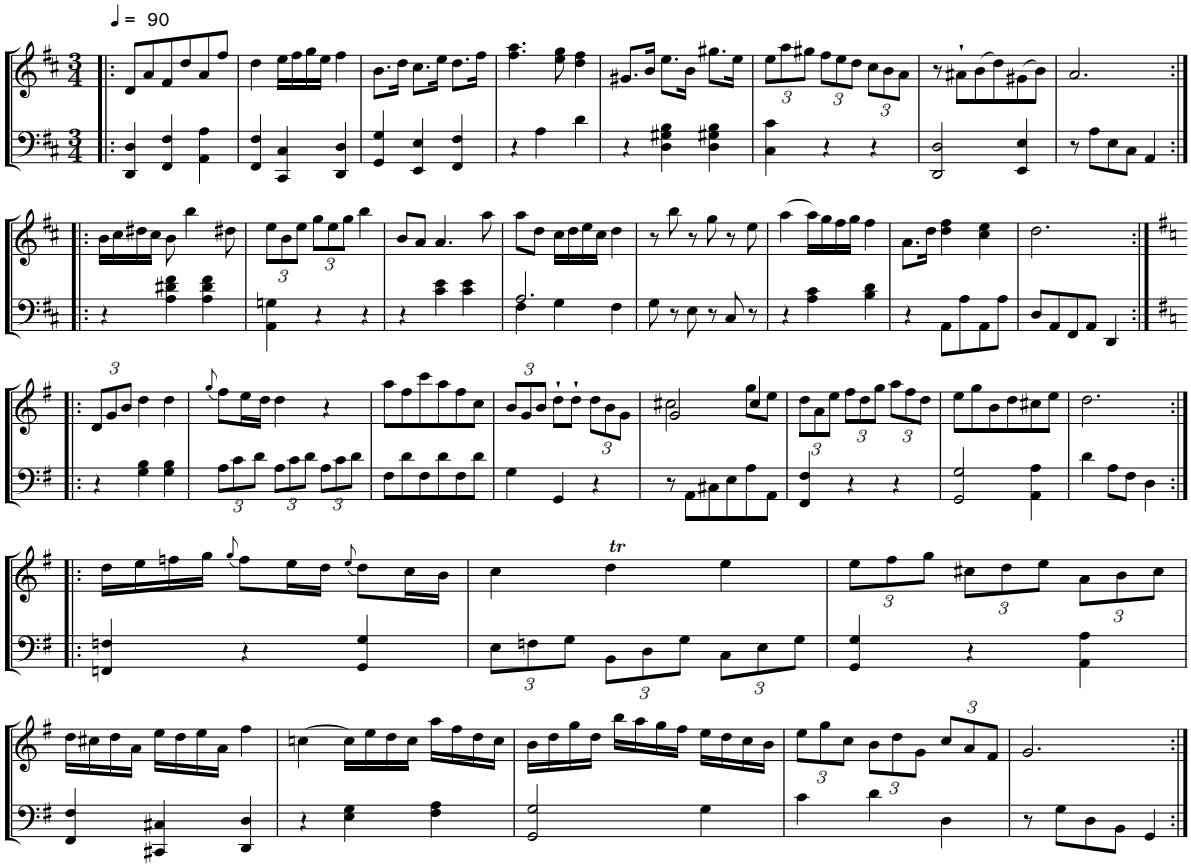
12-4-10-4-11-8-7-6-10-6-5-5-6-4-12-10-3-1-6-5-2-3-6-2-6-3-3-6-4-6-5-3

gfmt::54:95:42:13:135:133:118:107:65:143:7:34:76:58:44:131:75:6:62:53:14:43:52:71:11:34:93:86:57:60:50:21::

Perm. No.: 336110175222127950052368989 37



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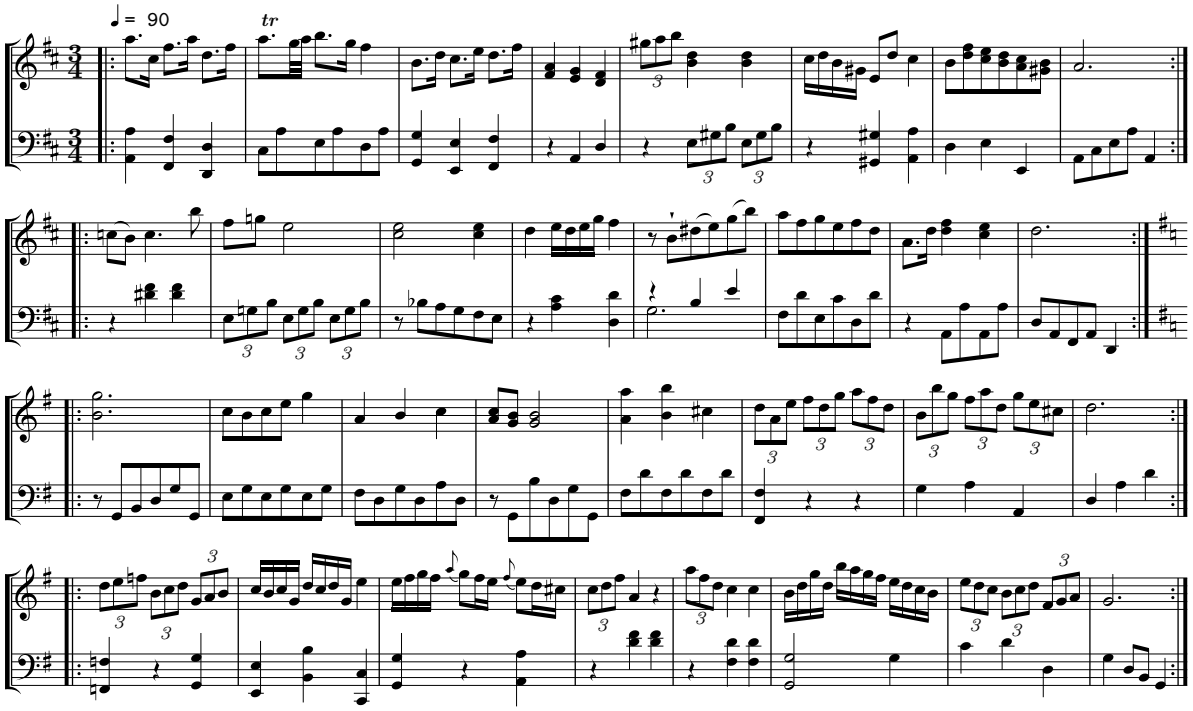
2-10-10-11-2-11-8-12-9-5-11-3-10-10-12-4-2-6-1-2-4-3-3-3-3-6-6-2-2-6-2-2

gfmt::96:142:42:61:105:47:21:5:120:176:31:56:137:38:44:131:56:45:59:74:29:43:15:80:9:92:24:84:8:60:47:88::

Perm. No.: 156140292491594600628759769 80

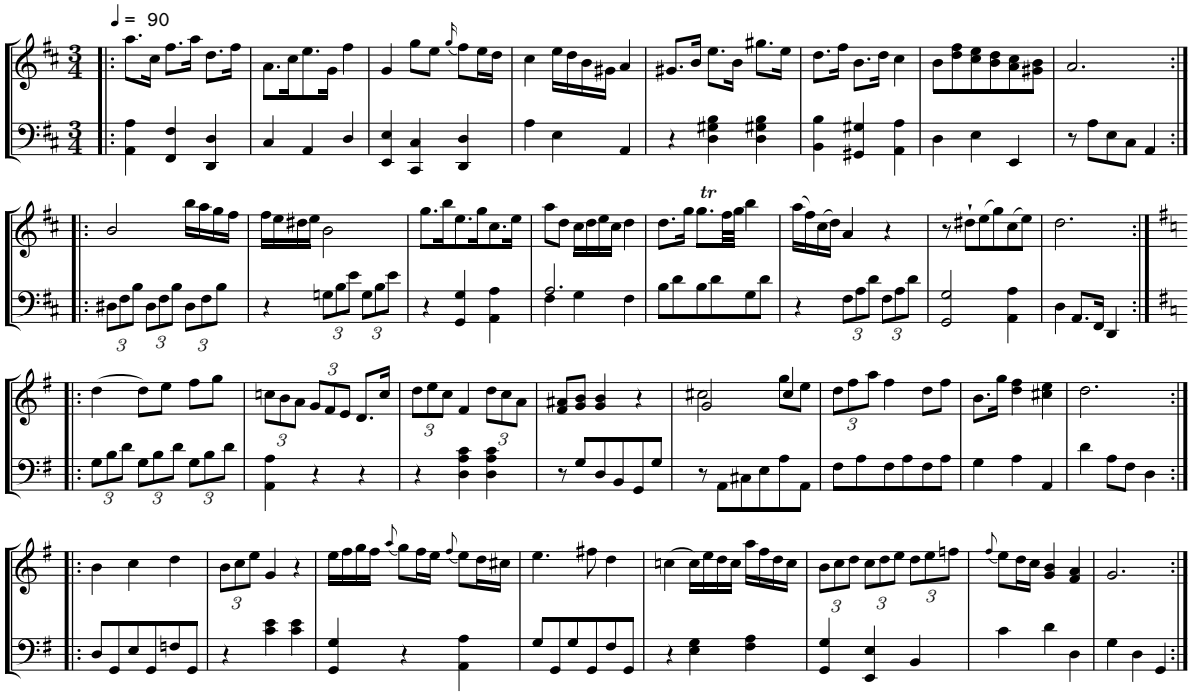


For audio (midi): gfmt-2-10-10-11-2-11-8-12-9-5-11-3-10-10-12-4-2-6-1-2-4-3-3-3-3-6-6-2-2-6-2-2.mid

2-8-12-3-11-9-8-11-8-4-2-5-2-3-8-2-1-4-3-4-2-6-2-6-4-2-6-4-4-3-1-1

gfmt::96:60:10:63:135:86:21:33:16:139:26:34:112:18:89:172:72:73:54:68:14:27:26:61:22:20:24:77:57:58:19:66::

Perm. No.: 8622590784329521905599680 48



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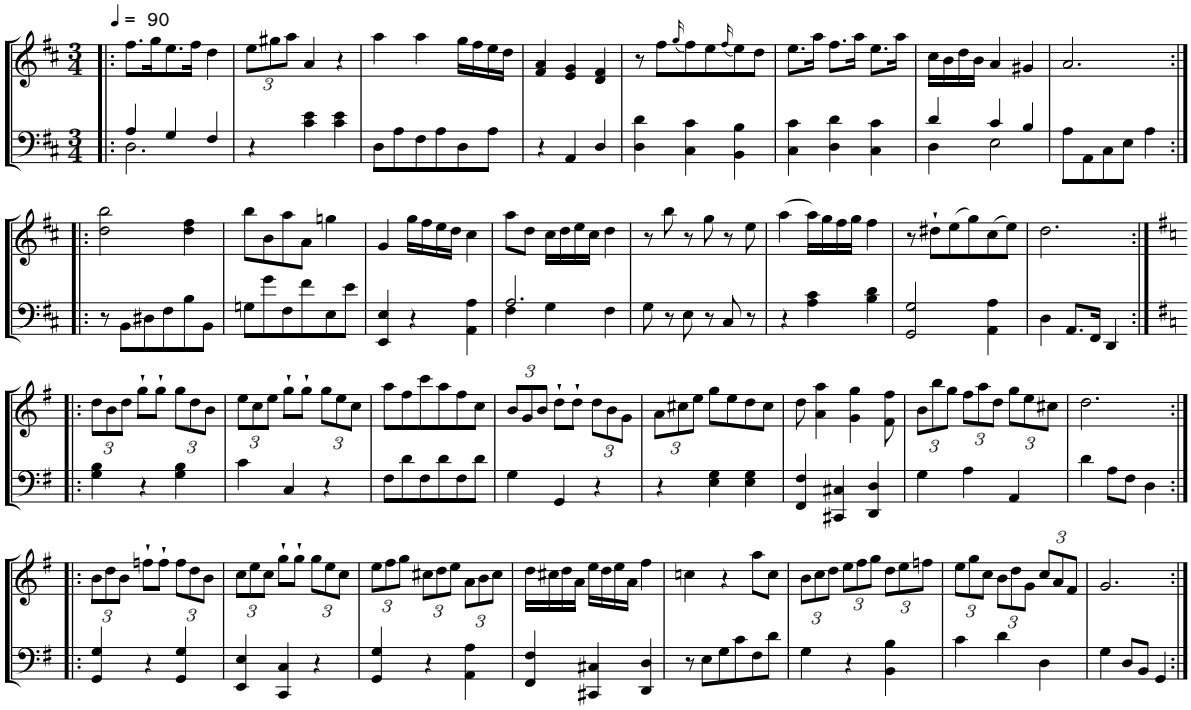
3-12-11-11-7-2-5-8-2-7-8-5-6-4-8-9-5-5-6-5-3-4-3-4-5-5-3-6-1-2-5-2

gfmt::32:130:165:61:154:122:159:127:70:71:57:34:76:58:89:172:83:3:62:53:65:55:15:71:63:85:93:86:30:35:50:88::

Perm. No.: 2022003007382336075198732721 4



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4-4-10-4-6-10-2-7-7-7-5-2-4-10-6-12-2-1-1-1-4-5-6-4-6-1-5-5-3-6-5-5

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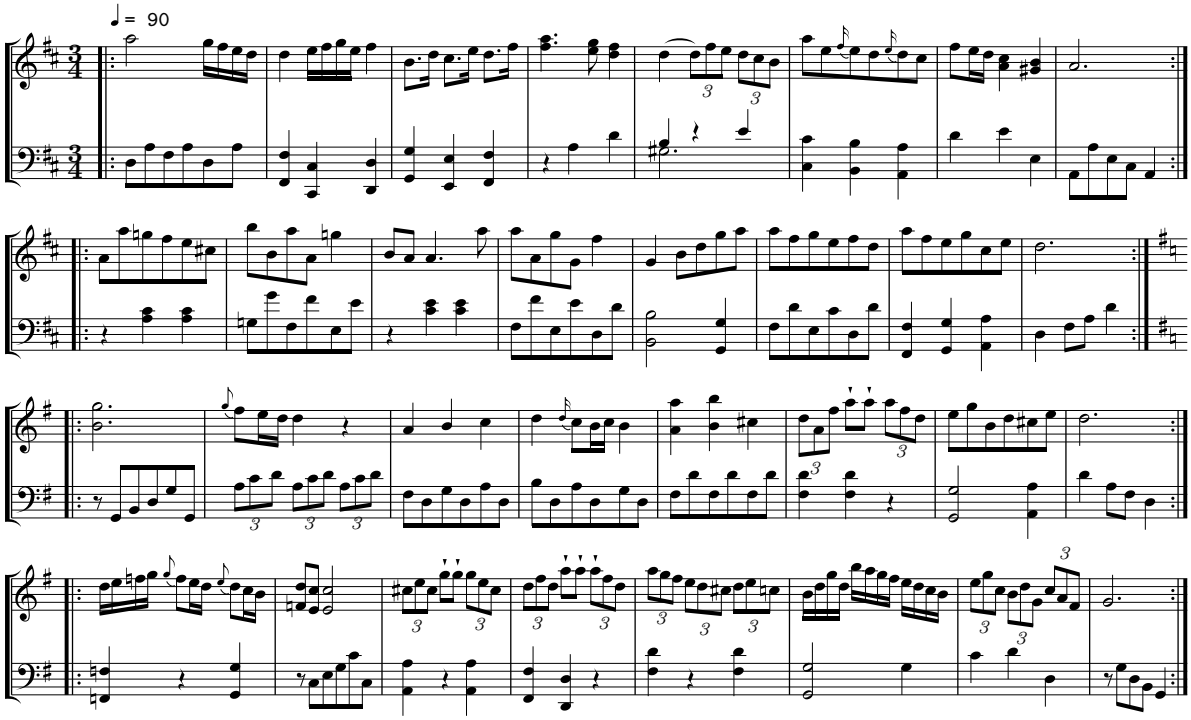
Perm. No.: 335492758503731140110638779 42

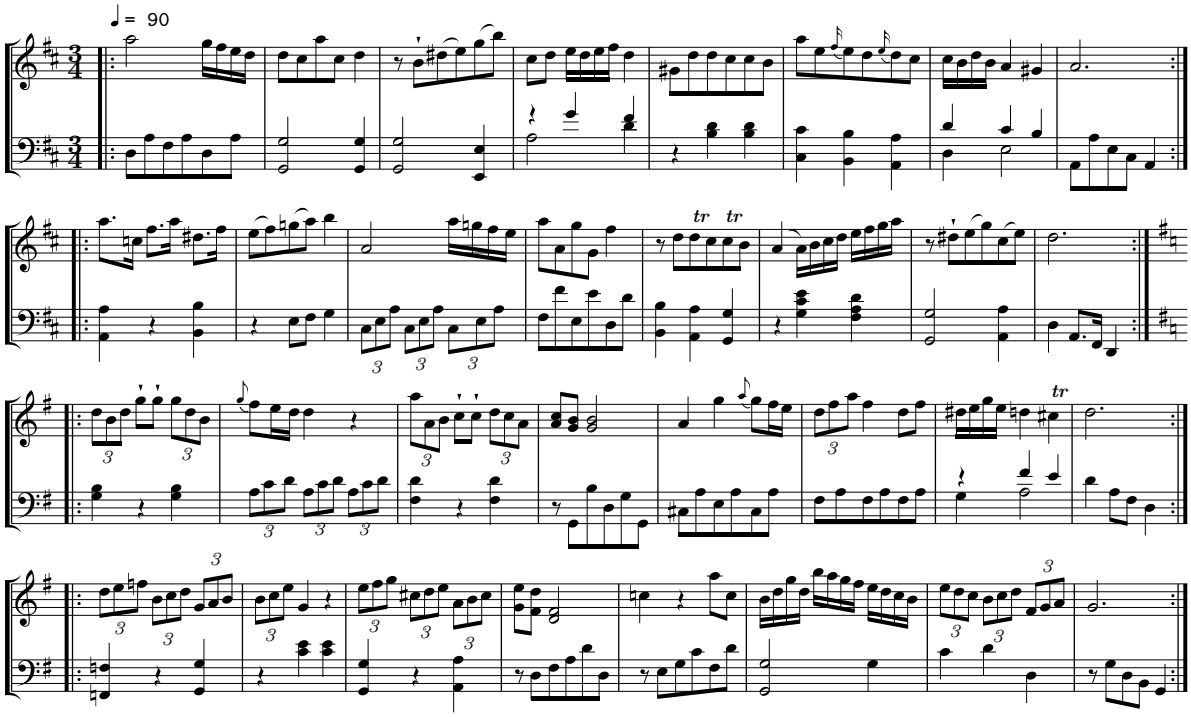


For audio (midi): gfmt-4-4-10-4-6-10-2-7-7-7-5-2-4-10-6-12-2-1-1-1-4-5-6-4-6-1-5-5-3-6-5-5.mid

4-6-3-9-4-10-5-7-12-12-6-2-3-6-8-3-5-1-5-2-1-6-4-6-3-2-3-1-1-6-2-6

gfmt::69:74:128:50:153:129:159:91:35:20:64:9:174:136:89:172:83:6:28:74:81:27:2:61:9:20:93:79:30:60:47:21::

Perm. No.: 27447647108840347164538050973



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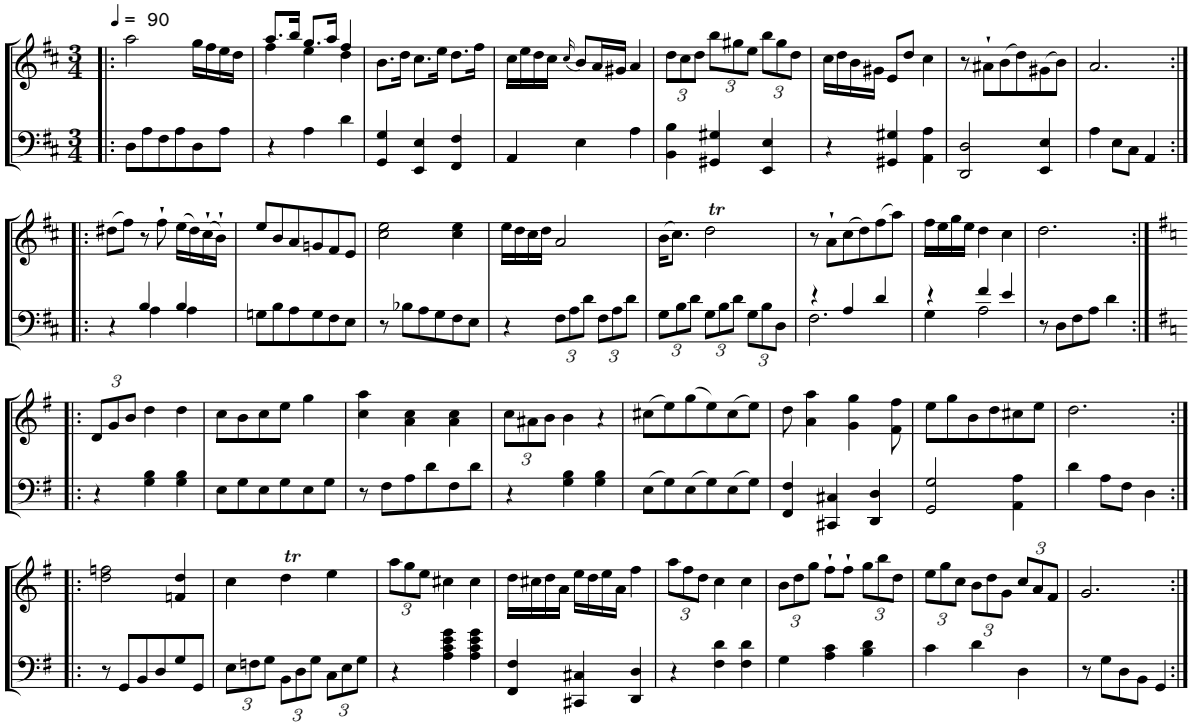
4-9-10-6-5-11-7-9-4-10-11-8-5-8-4-2-3-6-2-3-6-4-6-2-1-3-2-6-2-5-5-3

gfmt::69:84:42:45:161:47:118:94:66:77:31:175:67:168:145:79:75:45:42:1:4:55:52:71:36:34:64:86:8:23:50:21::

Perm. No.: 331684037917050615571664481116



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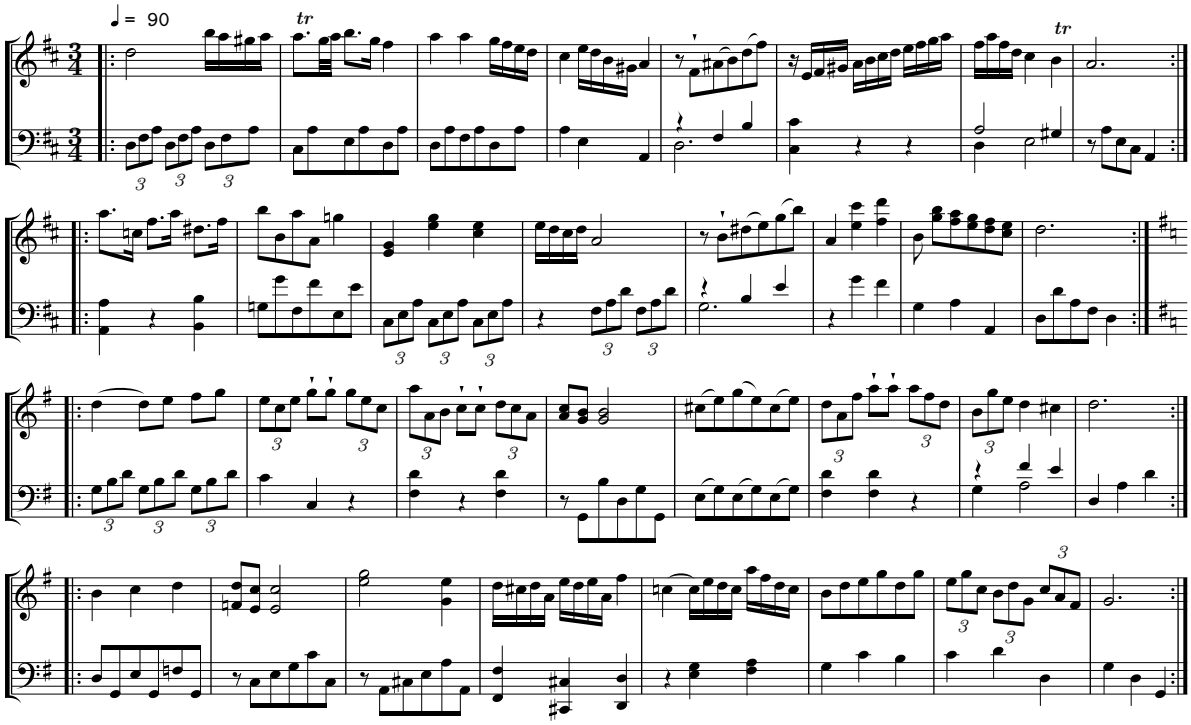
5-10-11-3-3-6-6-11-12-7-9-8-10-2-9-10-1-5-5-2-6-5-1-3-4-1-1-6-4-1-5-1

gfmt::40:142:165:63:146:97:36:33:35:71:48:175:137:49:72:111:72:3:28:74:4:17:89:80:22:5:46:86:57:95:50:66::

Perm. No.: 81470750627799999474866103469

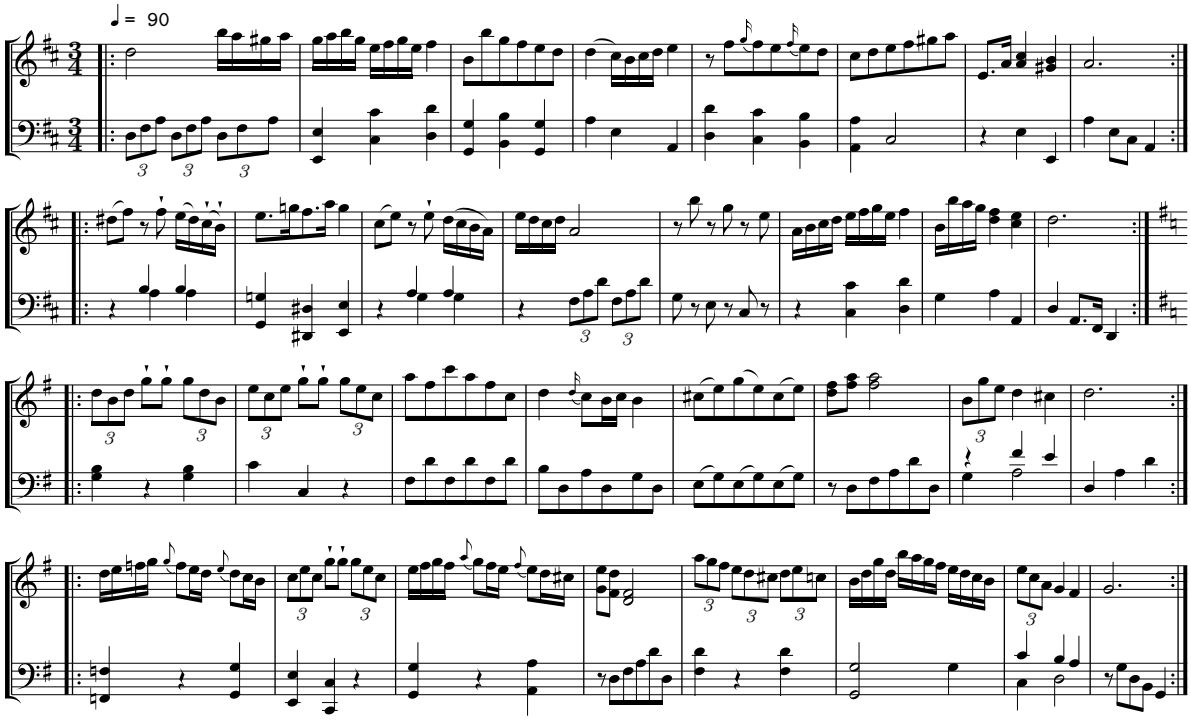


For audio (midi): gfmt-5-10-11-3-3-6-6-11-12-7-9-8-10-2-9-10-1-5-5-2-6-5-1-3-4-1-1-6-4-1-5-1.mid

5-2-7-5-7-3-9-9-4-2-10-8-6-12-7-4-5-5-6-1-6-2-1-3-6-5-6-1-3-6-3-3

gfmt::40:22:27:85:154:46:169:94:66:121:19:175:76:124:23:151:83:3:62:25:4:7:89:80:11:85:24:79:69:60:90:21::

Perm. No.: 29547251842421702895322636252



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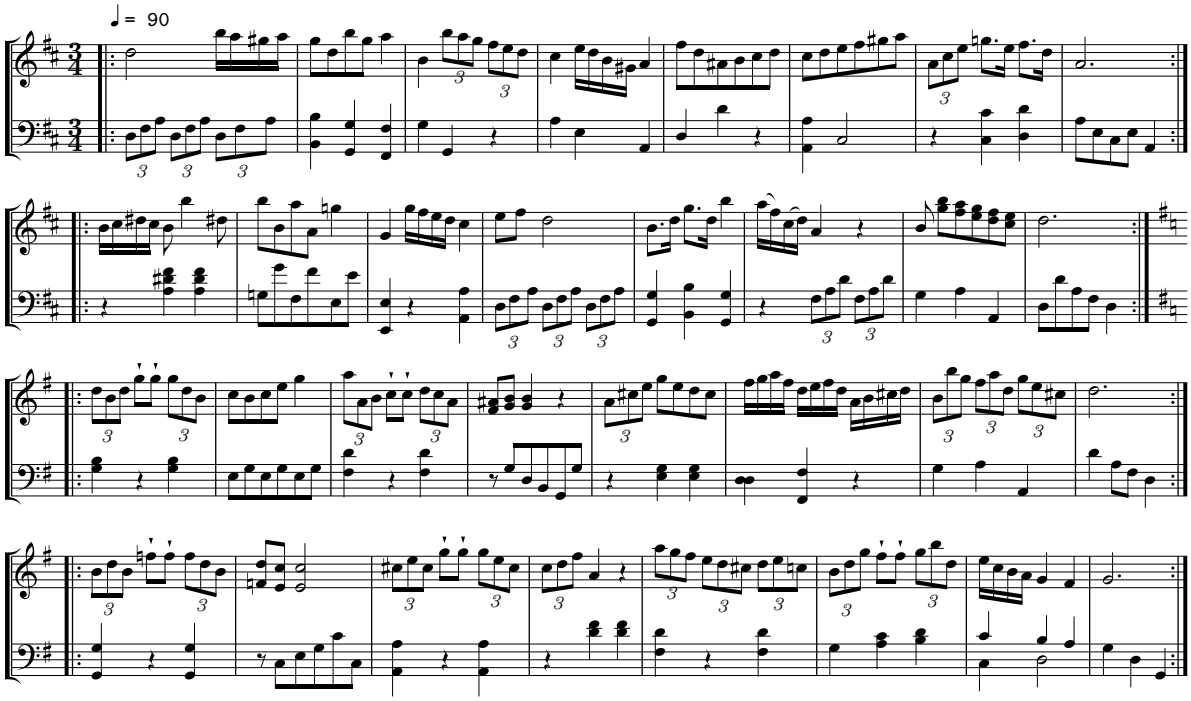
5-3-4-3-12-3-11-5-10-7-8-6-9-3-9-9-5-6-5-4-3-1-3-2-5-1-5-2-3-5-6-1

gfmt::40:06:158:63:28:46:147:100:65:71:57:125:51:18:72:111:83:45:28:68:65:41:15:71:63:5:32:84:69:23:78:66::

Perm. No.: 113679152296413647776638440 51



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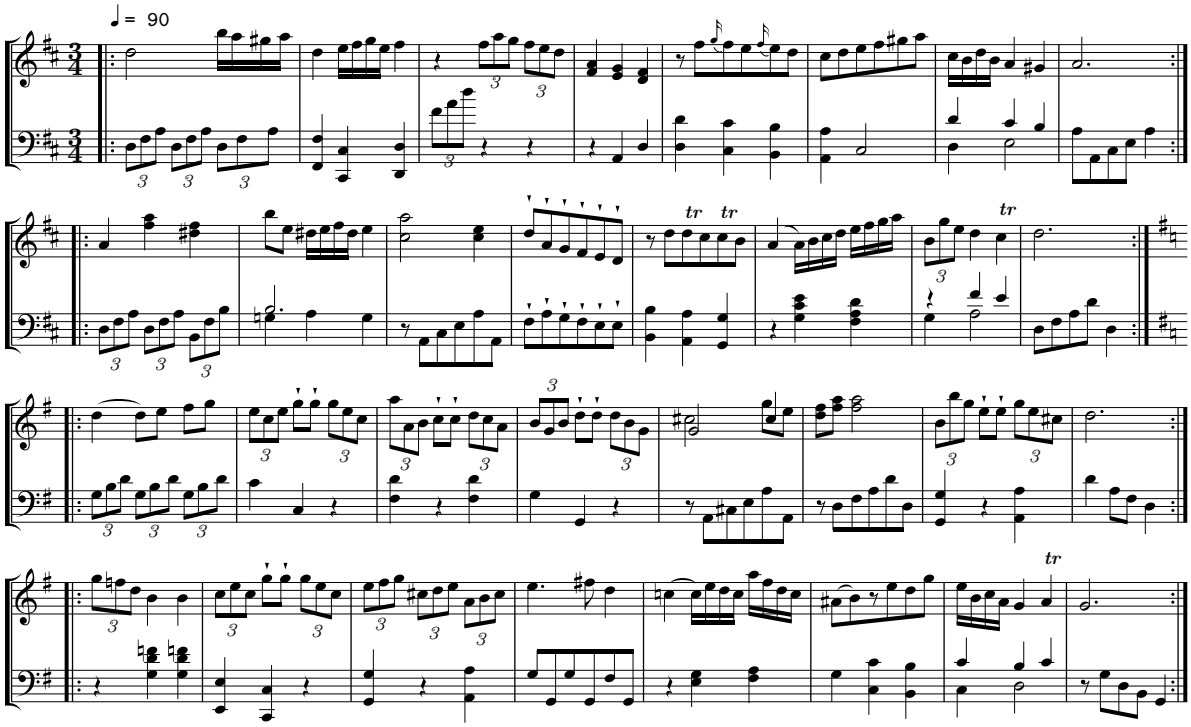
5-4-2-11-7-3-5-8-5-9-12-9-3-6-3-2-1-5-5-5-2-2-5-2-2-5-3-4-4-4-4-6

gfmt::40:95:141:61:154:46:159:127:90:88:108:166:174:136:116:83:72:3:28:53:14:7:44:71:76:85:93:77:57:87:33:21::

Perm. No.: 309477612809592061578848790 00



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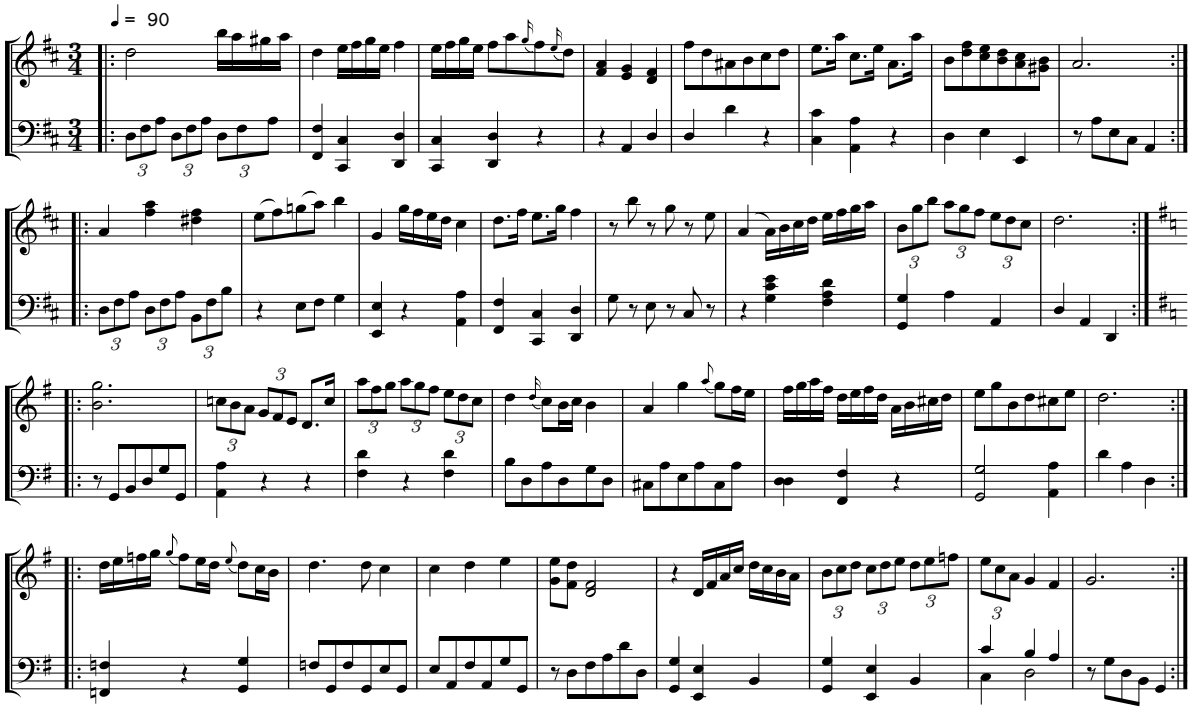
5-4-5-11-12-12-8-6-5-12-8-12-6-6-2-4-2-4-4-1-1-1-6-1-6-4-4-1-6-3-3-4

gfmt::40:95:113:61:28:37:21:107:90:20:57:92:76:136:109:14:56:73:16:25:81:41:52:13:11:67:49:79:51:58:90:21::

Perm. No.: 287172894295420340070544877728



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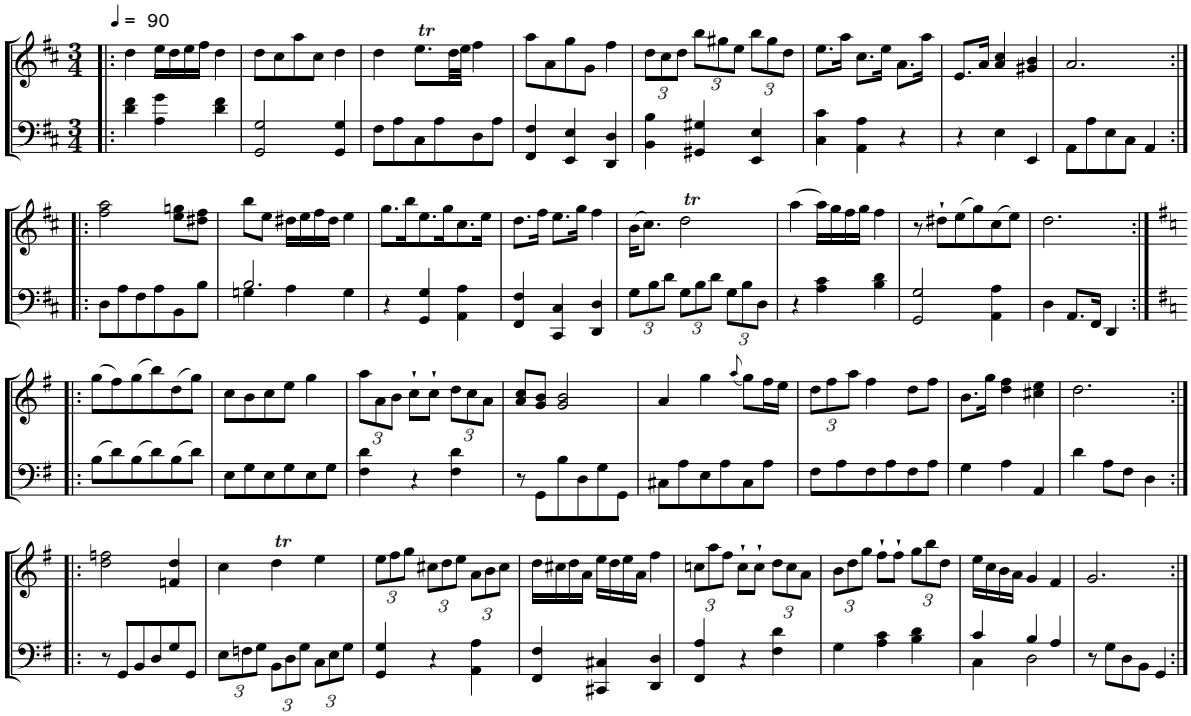
6-6-6-7-5-12-9-7-11-9-2-12-5-4-8-4-6-6-5-2-1-6-2-6-1-3-3-6-5-5-6-5

gfmt::148:74:163:167:161:37:169:91:102:88:26:92:67:58:89:172:18:45:28:74:81:27:26:61:36:34:93:86:12:23:78:21::

Perm. No.: 353191942052653783944192504 93

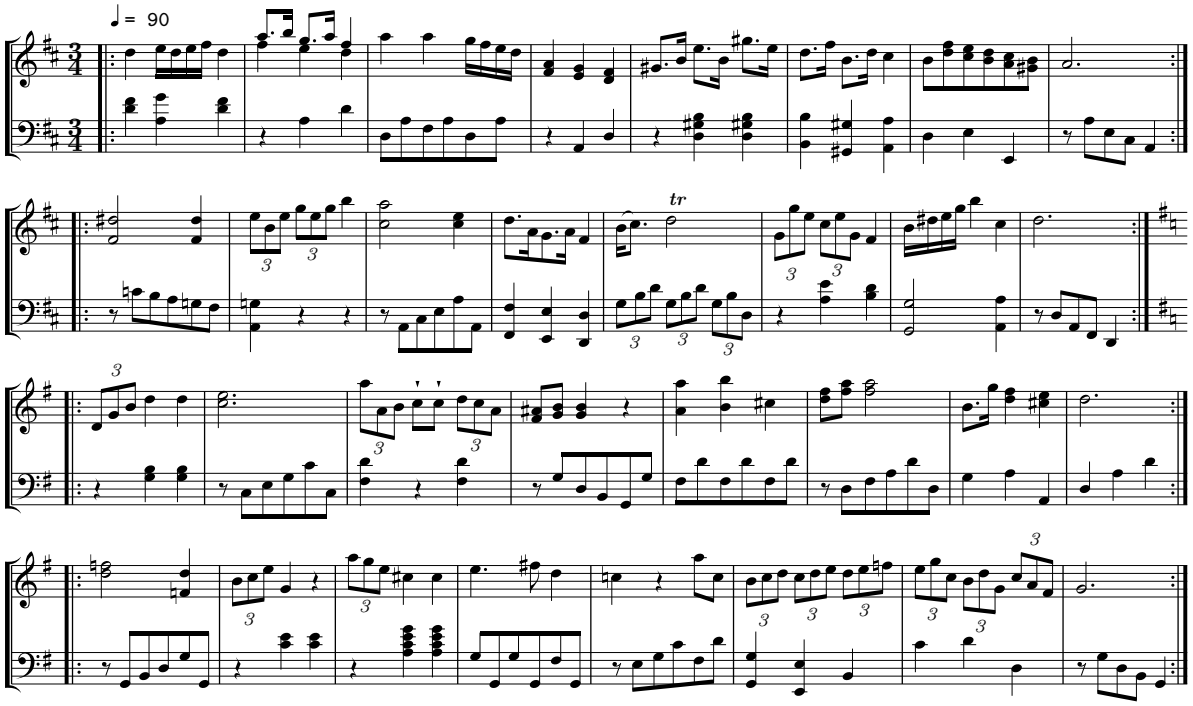


For audio (midi): gfmt-6-6-6-7-5-12-9-7-11-9-2-12-5-4-8-4-6-6-5-2-1-6-2-6-1-3-3-6-5-5-6-5.mid

6-9-11-11-11-9-8-11-3-6-12-11-5-5-10-7-3-2-5-4-4-2-2-3-1-2-2-4-1-3-5-3

`gfmt::148:84:165:61:135:86:21:33:117:143:108:164:67:160:149:8:75:82:28:68:29:7:26:80:36:20:64:77:30:58:50:21::`

`Perm. No.: 324333668753141988887508648040`



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7-3-3-6-6-12-6-5-8-5-3-6-10-4-10-2-6-1-4-4-1-3-4-4-5-6-5-3-2-3-4-5

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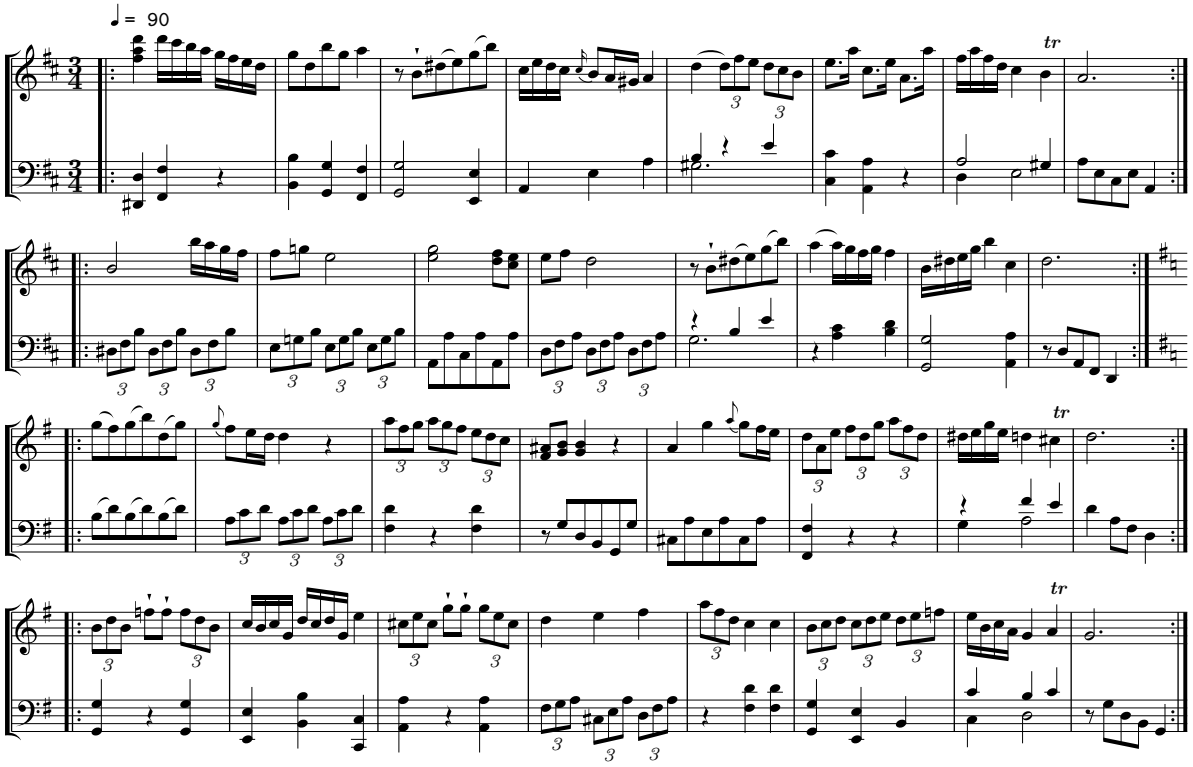
`Perm. No.: 3050114845066950606786416661 3`

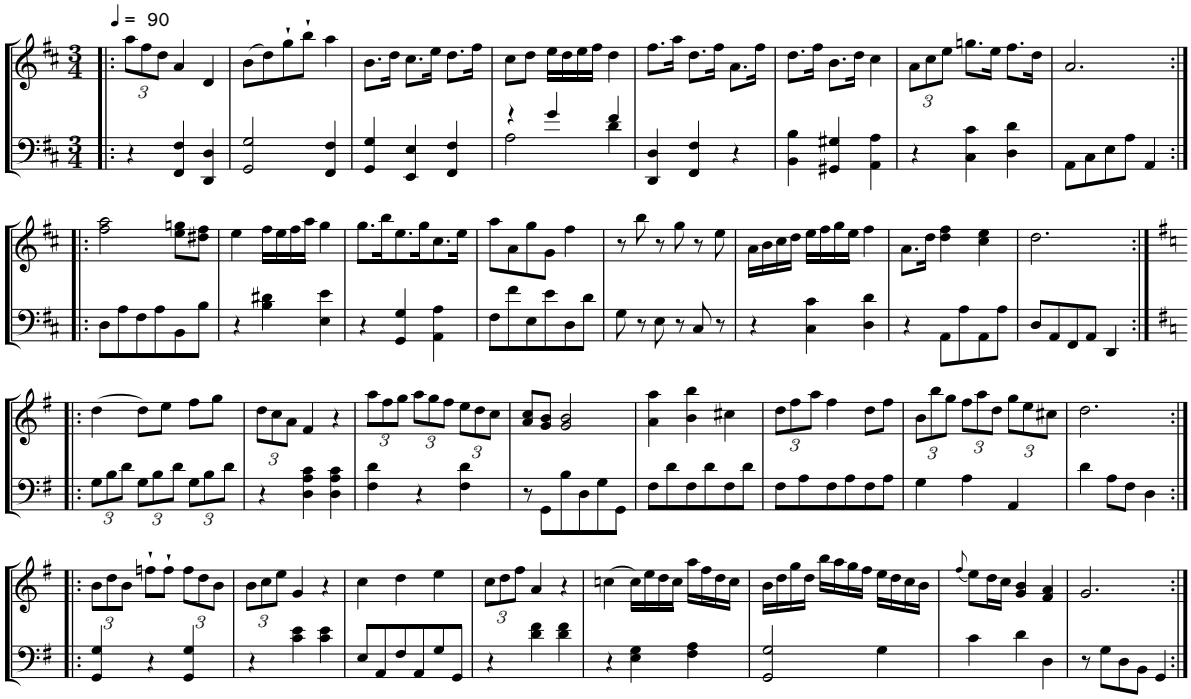


For audio (midi): gfmt-7-3-3-6-6-12-6-5-8-5-3-6-10-4-10-2-6-1-4-4-1-3-4-4-5-6-5-3-2-3-4-5.mid

8-7-10-9-10-9-11-12-11-8-2-2-6-12-12-2-1-3-4-2-4-6-3-5-5-2-4-2-4-6-1-4

gfmt::152:157:42:50:75:86:147:5:102:155:26:9:76:124:44:131:72:39:16:74:29:27:15:71:63:20:49:84:57:60:19:21::

Perm. No.: 256398328708568499828269441l0



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8-8-9-11-7-3-3-4-4-7-12-10-5-9-7-7-1-4-4-2-1-3-3-5-4-1-5-5-3-6-1-3

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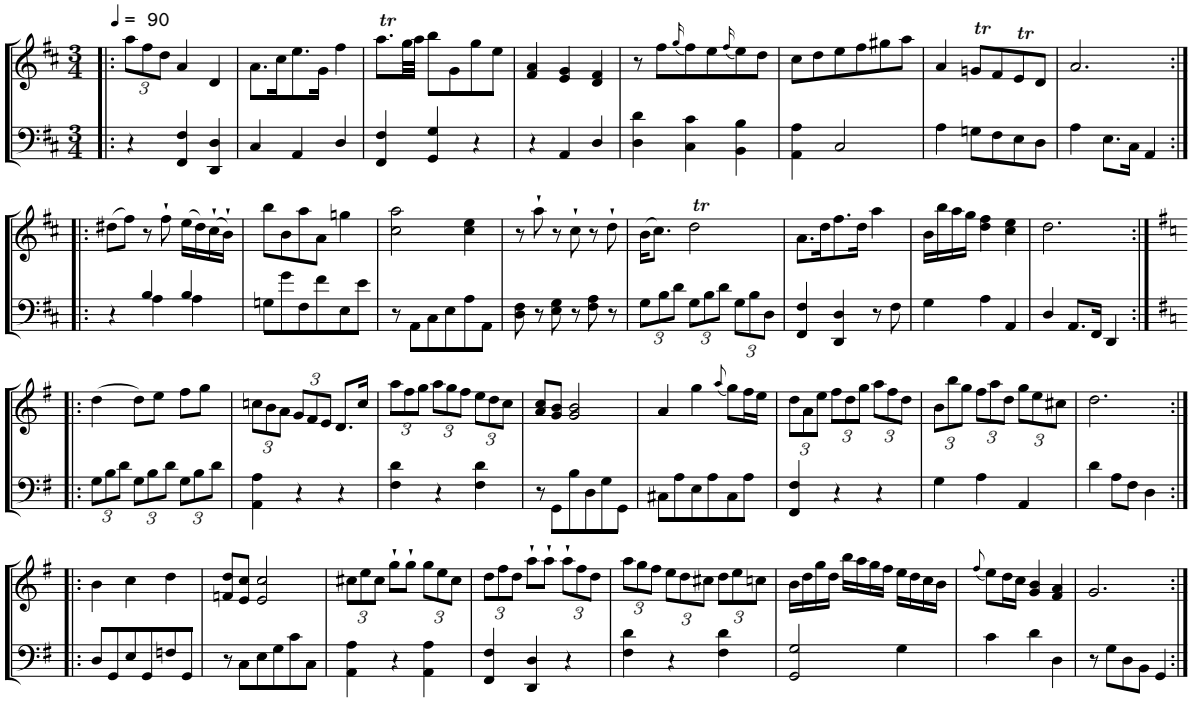

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9-2-6-5-6-6-5-12-7-10-3-9-10-12-5-8-6-3-6-2-6-4-3-4-5-2-2-5-2-1-5-2

gfmt::119:22:163:85:80:97:159:5:138:77:126:166:137:124:52:170:18:39:62:74:4:55:15:71:63:20:64:96:8:95:50:88::

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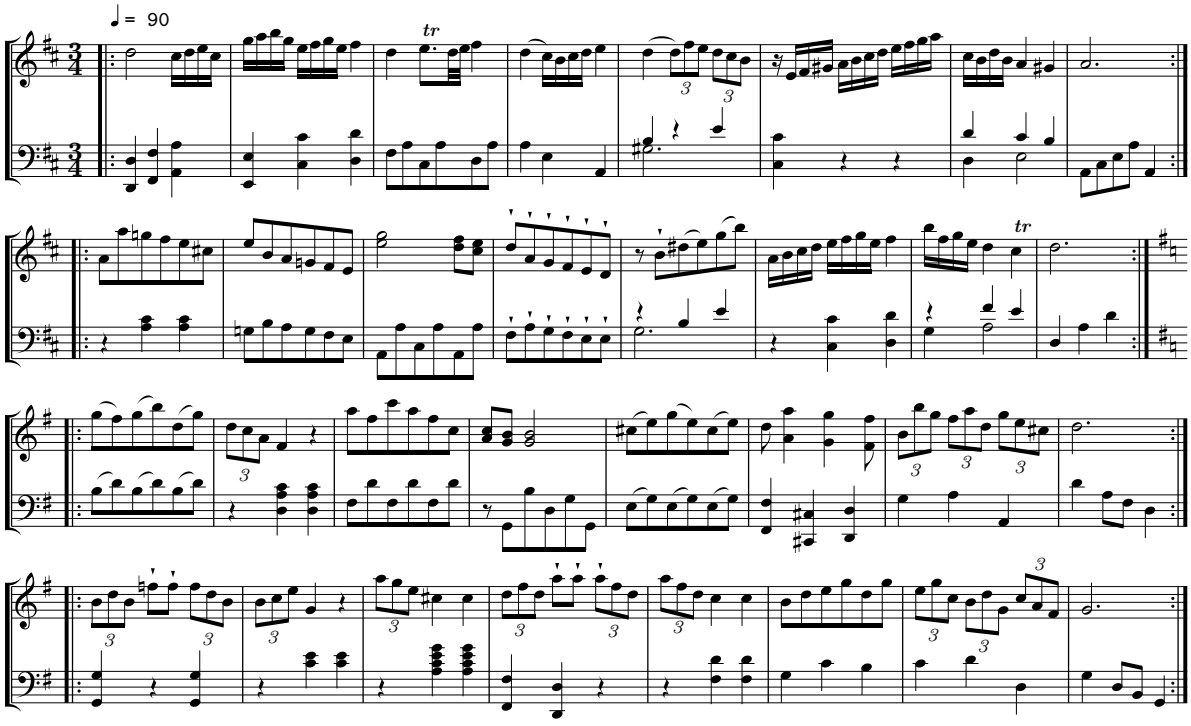

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9-7-10-3-2-4-12-12-5-7-10-4-9-5-11-6-6-5-3-1-1-1-6-2-5-5-2-4-4-6-1-1

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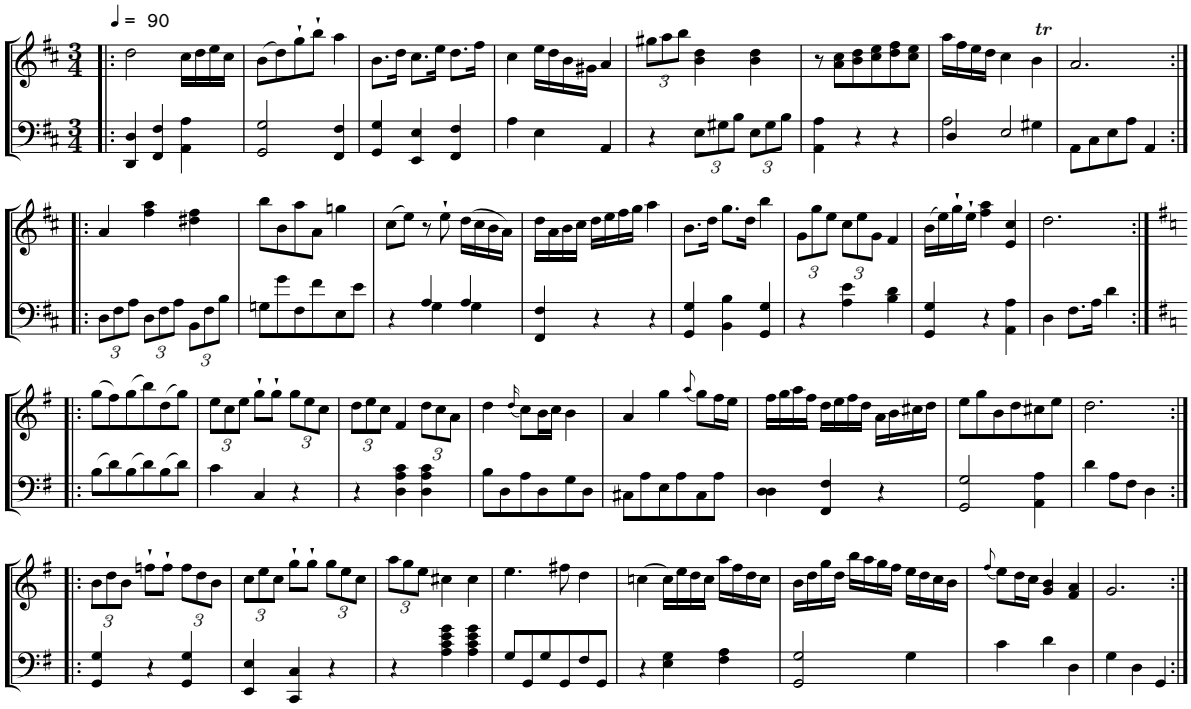

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9-8-10-11-9-12-5-2-8-7-2-4-12-6-7-3-2-6-6-1-2-2-5-5-5-1-2-1-6-1-4-2

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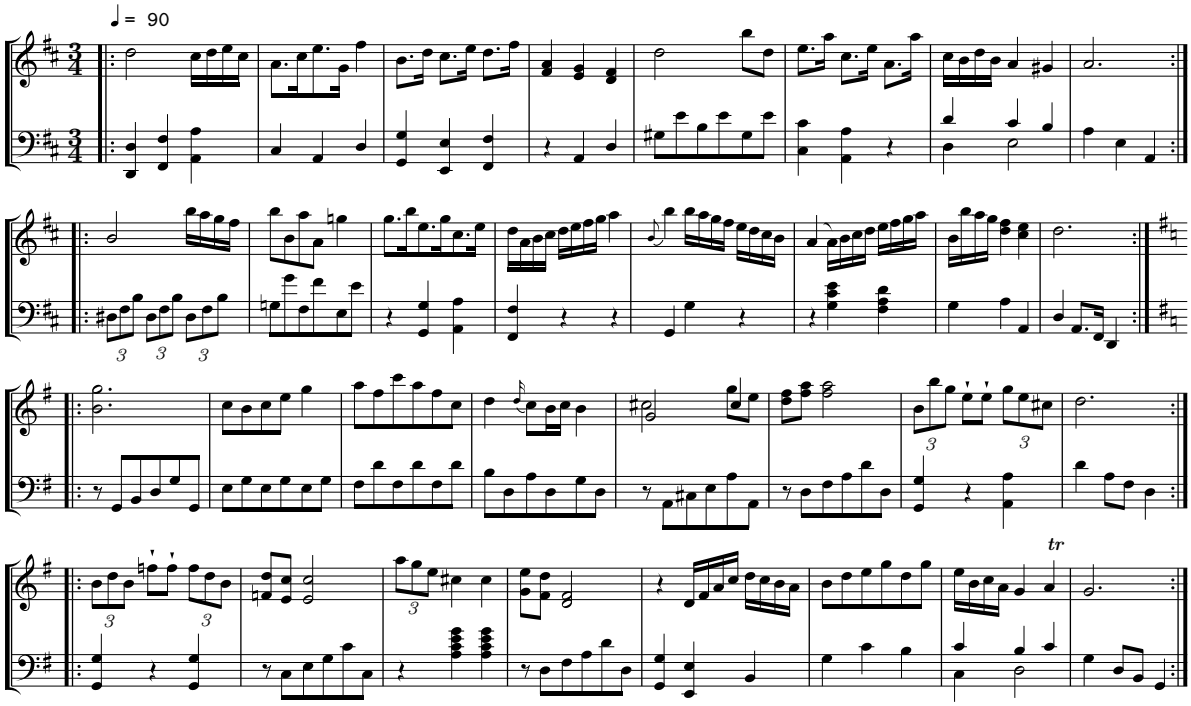

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9-8-3-11-4-6-6-10-3-8-4-4-10-7-4-11-4-5-6-3-2-4-3-2-6-4-3-6-1-5-3-4

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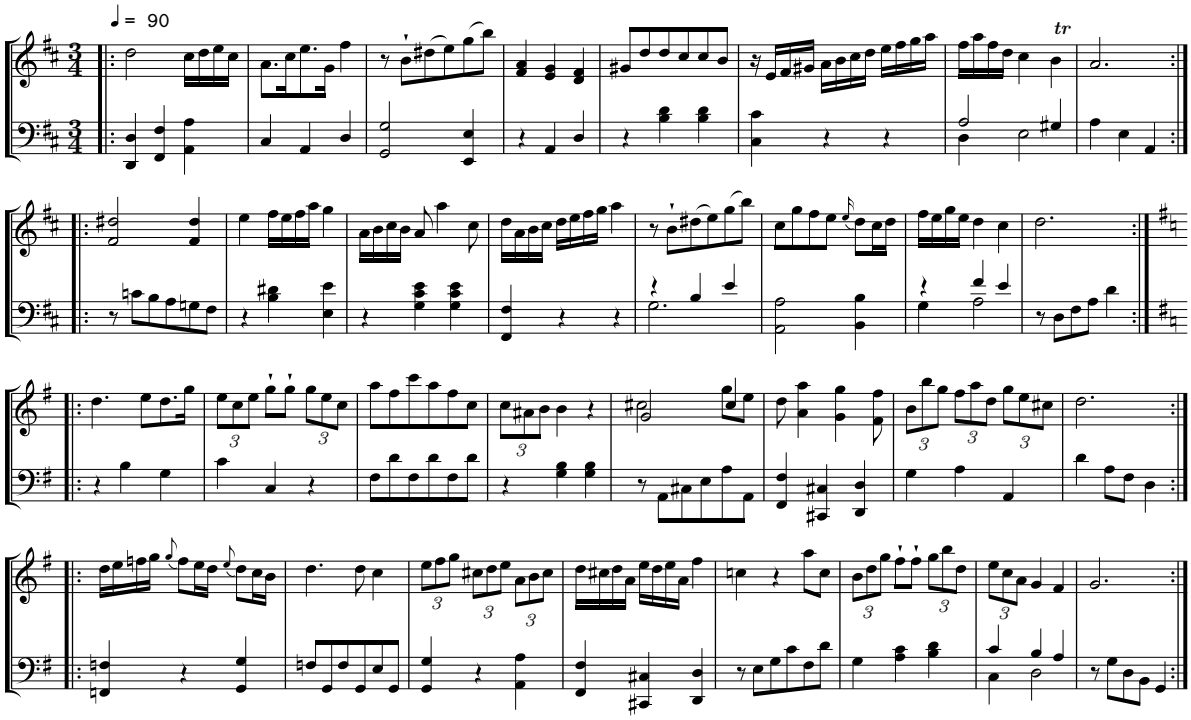

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6 License