

Weekly Meeting

Topic: Search results and greedy algorithm experiments

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16 runs, 2x2x2 then 4x4

idx	num_of_columns	columns	wlp	is_comp	b_columns	s22_max
8	6	1 2 4 8 7 11	0 3 0 0	FALSE	12 13 10 5 9 5	8
13	7	1 2 4 8 7 11 13	0 7 0 0 0	FALSE	NA	0
15	8	6 7 9 11 12 13 14 15	3 2 1 1 0	TRUE	2 2 1 1 4 5 4 5	14
10	9	5 6 7 9 10 11 13 14 15	2 0 0 1	TRUE	1 2 3 1 2 3 1 2 3	18
4	10	3 5 6 7 9 10 11 12 13 14	0 0 1	TRUE	1 1 2 8 1 2 4 4 2 1	15

16 runs, 4x4 then 2x2x2

idx	num_of_columns	a_columns	wlp	is_comp	b_columns	s22_max	subgroup_idx	subgroup_size
10	6	1 2 4 8 3 12	2 0 0 1	FALSE	10 13 10 7 5 5	12	3	5
11	6	1 2 4 8 3 5	2 1 0 0	FALSE	6 13 11 6 9 9	12	4	5
15	7	1 2 4 8 3 5 10	3 2 1 1 0	FALSE	6 9 11 7 13 9 6	15	3	6
14	8	6 7 9 10 11 12 13 15	2 3 2 0 0	TRUE	2 2 1 4 3 4 3 1	16	1	2
10	9	5 6 7 9 10 11 13 14 15	2 0 0 1	TRUE	1 2 3 1 2 3 1 2 3	18	2	2
4	10	3 5 6 7 9 10 11 12 13 14	0 0 1	TRUE	1 1 2 8 1 2 4 4 2 1	15	1	1

32 runs, 2x2x2 then 4x4

idx	num_of_columns	columns	wlp	is_comp	b_columns	s22_max
70	10	1 2 4 8 16 15 19 21 25 30	0 10 16 0 0 5 0 0	FALSE	10 29 3 5 12 20 9 3 14 6	44
71	10	1 2 4 8 16 31 7 11 21 25	0 15 0 15 0 0 0 1	FALSE	14 12 9 20 3 5 17 6 3 10	40
72	10	1 2 4 8 16 31 7 11 21 13	0 16 0 12 0 3 0 0	FALSE	22 20 10 19 3 5 9 18 12 17	41
73	10	1 2 4 8 16 31 7 11 13 14	0 18 0 8 0 5 0 0	FALSE	28 17 19 20 6 5 25 18 21 21	41
120	11	1 2 4 8 16 31 7 11 21 25 13	0 25 0 27 0 10 0 1 0	FALSE	26 12 10 18 6 3 19 5 6 15 17	47
121	11	1 2 4 8 16 31 7 11 21 13 14	0 26 0 24 0 13 0 0 0	FALSE	22 20 24 19 3 5 25 18 15 17 19	48
187	12	1 2 4 8 16 31 7 11 21 25 13 14	0 38 0 52 0 33 0 4 0 0	FALSE	26 20 19 18 6 3 17 19 9 3 19 18	52
188	12	1 2 4 8 16 31 7 11 21 13 14 26	0 39 0 48 0 39 0 0 0 1	FALSE	22 17 25 17 12 3 19 18 6 22 22 6	52
278	13	1 2 4 8 16 31 7 11 21 25 13 14 19	0 55 0 96 0 87 0 16 0 1 0	FALSE	22 28 24 18 6 5 27 22 15 3 17 22 9	55
391	14	1 2 4 8 16 31 7 11 21 25 13 14 19 22	0 77 0 168 0 203 0 56 0 7 0 0	FALSE	26 24 26 18 10 3 26 23 9 5 17 18 15 12	48
520	15	1 2 4 8 16 31 7 11 21 25 13 14 19 22 26	0 105 0 280 0 435 0 168 0 35 0 0 0 0	FALSE	28 28 24 20 12 3 27 23 9 5 17 18 15 10 6	0
661	16	10 12 17 18 19 20 21 22 23 24 25 26 27 28 29 30	23 60 89 141 198 193 146 98 51 18 5 1 0	TRUE	1 1 14 2 3 4 5 6 8 7 6 5 11 3 2 14	71
516	17	9 10 11 12 13 14 18 20 22 24 25 26 27 28 29 30 31	18 42 57 84 104 89 62 36 14 4 1 0	TRUE	6 2 4 3 5 1 2 3 7 8 8 15 8 15 8 15 8	85
515	17	9 10 12 17 18 19 20 21 22 23 24 25 26 27 28 29 30	18 42 56 85 108 85 56 42 18 0 0 1	TRUE	2 1 2 14 13 3 4 5 6 7 8 6 5 4 3 13 1	85
386	18	9 10 11 12 13 14 17 18 20 23 24 25 26 27 28 29 30...	14 29 34 46 54 41 22 10 4 1 0	TRUE	6 2 4 3 5 6 4 2 7 1 8 15 15 8 15 8 15	96
384	18	9 10 11 12 13 14 18 20 22 23 24 25 26 27 28 29 30...	14 28 35 50 50 35 28 14 0 0 1	TRUE	6 2 4 4 5 1 3 7 3 7 8 8 15 8 15 8 15 15	96
383	18	6 9 10 11 12 13 14 20 22 23 24 25 26 27 28 29 30 31	14 28 34 50 54 35 22 14 4 0 0	TRUE	2 1 2 3 3 5 1 1 4 7 8 8 15 8 15 15 15 15	98
382	18	9 10 12 13 14 15 17 18 20 21 22 23 25 26 28 29 30...	14 23 24 56 76 39 8 8 6 1 0	TRUE	1 1 4 5 5 4 2 2 4 6 6 4 1 1 7 5 5 7	114
269	19	5 6 9 10 11 12 13 14 20 22 23 24 25 26 27 28 29 3...	11 18 18 28 28 13 6 4 1 0	TRUE	2 1 1 2 3 3 2 1 4 3 4 8 8 8 15 15 15 15	110
268	19	9 10 12 13 14 15 17 18 20 21 22 23 25 26 27 28 29...	11 16 14 30 36 15 2 2 1 0	TRUE	2 1 7 5 5 7 1 2 4 6 6 4 1 2 8 4 5 6 7	120
178	20	5 6 9 10 11 12 13 14 20 21 22 23 24 25 26 27 28 2...	9 11 7 15 15 4 1 1 0	TRUE	1 1 1 2 3 3 2 1 4 7 7 4 8 8 8 15 15 15 15	122
114	21	9 10 11 12 13 14 15 17 18 19 20 21 22 23 25 26 27...	8 7 0 7 8 0 0 1	TRUE	1 2 3 4 5 6 7 1 2 3 4 5 6 7 1 2 3 4 5 6 7	126
55	22	3 5 6 7 9 10 11 12 13 14 20 21 22 23 24 25 26 27 2...	4 3 3 4 0 0 1	TRUE	1 1 2 8 1 2 4 4 2 1 4 4 4 4 8 8 8 15 15 15 15	123

32 runs, 4x4 then 2x2x2

idx	num_of_columns	a_columns	wlp	is_comp	b_columns	s22_max	subgroup_idx	subgroup_size
70	10	1 2 4 8 16 15 19 21 25 30	0 10 16 0 0 5 0 0	FALSE	28 5 18 6 10 3 11 10 13 9	44	1	50
122	11	1 2 4 8 16 15 19 21 25 30 3	2 14 22 8 6 9 2 0 0	FALSE	10 5 24 23 6 18 9 14 13 12 5	52	3	67
197	12	1 2 4 8 16 31 7 11 21 13 17 3	5 19 29 25 23 16 7 3 0 0	FALSE	14 25 18 6 10 5 27 22 12 19 9 20	61	11	91
288	13	1 2 4 8 16 15 19 21 25 30 3 5 10	7 26 48 48 46 45 24 8 3 0 0	FALSE	28 20 9 6 7 18 9 13 6 12 20 11 17	70	11	113
404	14	1 2 4 8 16 15 19 21 25 30 3 5 10 29	10 34 72 93 92 93 72 34 10 0 0 1	FALSE	12 9 18 20 11 6 12 7 14 6 13 17 17 7	80	14	129
405	14	1 2 4 8 16 15 19 21 25 30 3 5 10 12	10 35 72 88 92 103 72 24 10 5 0 0	FALSE	22 9 18 18 13 23 7 9 6 6 13 17 17 7	80	15	129
543	15	1 2 4 8 16 15 19 21 25 3 29 5 27 7 14	14 45 102 160 180 195 180 96 30 15 6 0 0	FALSE	30 20 24 22 10 6 11 9 6 17 12 18 12 10 20	91	24	145
635	16	7 9 11 13 14 18 20 22 23 24 26 27 28 29 30 31	18 45 82 160 220 195 140 96 50 15 2 0 0	TRUE	2 3 3 5 4 1 1 6 6 1 15 2 12 4 15 12	101	109	131
482	17	3 6 9 12 14 15 18 19 22 23 24 25 26 27 28 29 30	14 33 56 96 116 91 56 32 14 3 0 0	TRUE	1 1 4 4 5 5 7 7 2 8 13 8 10 11 13 2 1	110	85	113
477	17	6 7 9 11 13 14 18 20 22 23 24 26 27 28 29 30 31	14 31 56 104 116 79 56 40 14 1 0 0	TRUE	3 2 1 4 2 4 1 1 3 4 8 3 2 12 12 15 10	110	80	113
366	18	5 6 7 9 10 11 13 14 18 20 22 23 24 26 27 28 30 31	12 23 32 56 64 39 16 8 4 1 0	TRUE	16 19 3 1 2 3 1 19 3 4 15 4 1 15 2 12 15 2	120	75	88
364	18	3 5 7 10 11 12 13 14 18 20 22 24 25 26 27 28 29 30	12 22 33 60 60 33 22 12 0 0 1	TRUE	16 1 16 2 2 4 4 17 1 1 6 15 6 15 8 9 2 15	120	74	88
247	19	5 6 7 9 10 11 13 14 18 20 22 23 24 26 27 28 29 30 ...	9 14 20 36 30 9 4 4 1 0	TRUE	16 2 3 16 2 3 1 1 2 1 3 4 1 3 8 15 12 15 12	128	41	55
138	20	5 6 7 10 11 12 13 14 17 18 20 22 23 24 25 26 27 2...	5 10 16 16 10 5 0 0 1	TRUE	16 9 3 2 2 3 2 1 1 1 1 3 4 4 9 9 8 8 2 3	136	9	25
70	21	3 5 6 7 9 10 11 12 13 14 17 18 20 22 23 24 26 27 2...	0 10 16 0 0 5 0 0	TRUE	1 1 2 25 16 19 4 21 2 16 1 1 1 8 2 8 4 8 15 8 15	142	1	13
37	22	3 5 6 7 9 10 11 12 13 14 17 18 20 23 24 25 26 27 2...	0 7 7 0 0 0 1	TRUE	16 1 16 8 1 2 4 4 2 1 4 1 2 2 8 15 15 8 15 8 8 15	133	1	2

81 runs, 3x3x3 then 9x9

idx	num_of_columns	columns	wlp	is_comp	b_columns	s22_max
390	11	1 2 5 14 22 9 24 31 34 39 3	3 42 111 132	FALSE	18 10 16 6 7 26 4 11 8 8 21	49
391	11	1 2 5 14 22 9 24 31 3 25 13	3 48 84 177	FALSE	18 33 18 12 4 17 6 7 20 6 15	46
392	11	1 2 5 14 22 9 24 25 7 12 18	3 54 63 195	FALSE	23 19 30 13 6 17 6 3 30 20 3	43
792	12	1 2 5 14 22 9 24 31 3 25 13 37	4 72 144 354	FALSE	18 19 29 12 7 16 7 7 16 6 18 6	52
793	12	1 2 5 14 22 9 24 25 7 12 18 38	4 81 108 390	FALSE	27 37 31 3 3 16 6 3 30 20 3 13	45
1599	13	1 2 5 14 22 9 24 31 3 25 13 37 6	7 102 219 690	FALSE	18 19 18 12 12 16 7 7 20 12 15 7 18	56
1600	13	1 2 5 14 22 9 24 25 7 12 18 38 3	7 105 207 696	FALSE	19 33 28 13 13 16 13 6 30 17 6 6 15	54
3104	14	1 2 5 14 22 9 24 31 3 25 13 37 6 18	10 140 334 1236	FALSE	23 19 30 7 7 16 12 12 26 12 17 7 4 10	61
3105	14	1 2 5 14 22 9 24 25 7 12 18 38 3 31	10 141 330 1236	FALSE	19 33 28 13 13 16 6 6 30 16 6 6 26 13	58
3106	14	1 2 5 14 22 9 24 31 3 25 13 37 6 7	10 144 330 1209	FALSE	23 33 29 12 12 18 12 12 16 12 15 12 27 18	57
5763	15	1 2 5 14 22 9 24 31 3 25 13 37 6 18 7	13 192 495 2055	FALSE	23 19 29 12 12 16 12 12 26 12 15 12 27 10 28	57
10067	16	1 2 5 14 22 9 24 31 3 25 13 37 6 18 7 35	16 256 720 3288	FALSE	23 19 29 12 12 26 12 12 20 12 17 12 27 12 16 12	48
16541	17	1 2 5 14 22 9 24 31 3 25 13 37 6 18 7 35 15	24 304 1096 4984	FALSE	23 19 29 12 12 26 12 12 20 12 17 12 27 12 16 12 4	60
25387	18	1 2 5 14 22 9 24 31 3 25 13 37 15 23 16 34 6 38	30 369 1602 7443	FALSE	18 33 30 12 12 18 12 7 26 7 18 7 10 4 10 4 4 10	81
36526	19	1 2 5 14 22 9 24 31 3 25 13 37 15 23 16 34 6 38 27	39 435 2313 10521	FALSE	18 33 30 12 12 18 12 7 26 7 18 7 10 4 10 4 4 10 8	99
49289	20	1 2 5 14 22 9 24 31 3 25 13 37 15 23 16 34 6 38 27 8	51 519 3108 15051	FALSE	18 33 30 12 12 18 12 7 26 7 18 7 10 4 10 4 4 10 11 4	111
62488	20	7 11 12 13 17 18 19 21 23 26 27 28 30 32 34 35 37...	69 483 2955 15474	TRUE	3 4 3 4 1 4 10 5 2 1 3 1 4 1 3 2 10 8 9 5	111
48963	21	7 11 12 13 17 18 19 20 21 23 26 27 28 30 32 34 35...	58 383 2220 10864	TRUE	3 4 3 4 1 4 10 6 5 8 1 3 1 4 1 3 2 10 8 9 5	114
35798	22	7 11 12 13 17 18 19 20 21 23 26 27 28 29 30 32 34...	48 300 1647 7449	TRUE	3 4 3 4 1 4 10 6 5 8 1 3 1 2 4 1 3 2 10 8 9 5	126
24493	23	7 11 12 13 15 16 17 18 23 25 26 27 28 29 30 32 33...	40 230 1196 4992	TRUE	3 4 3 4 5 6 10 4 2 10 6 9 6 8 9 5 6 3 8 1 2 3 1	138
15060	24	3 6 7 8 10 12 13 16 17 18 19 20 23 27 28 30 32 33 ...	32 174 855 3242	TRUE	1 21 2 24 22 1 4 2 5 4 2 5 11 2 1 9 11 9 5 4 1 4 9 1	147
15053	24	3 4 6 8 12 13 16 17 18 19 20 23 26 27 28 29 30 31 ...	32 168 864 3296	TRUE	7 24 1 14 1 15 5 10 11 10 5 9 1 7 1 9 9 10 1 7 10 1...	123
8874	25	3 4 6 7 11 12 13 16 17 19 20 21 23 25 26 28 30 32 ...	26 126 594 2060	TRUE	15 14 1 15 18 24 14 2 2 9 5 1 5 10 2 1 1 9 9 8 8 5 1...	138

81 runs, 9x9 then 3x3x3

idx	num_of_columns	a_columns	wlp	is_comp	b_columns	s22_max	subgroup_idx	subgroup_size
420	11	1 2 5 14 22 9 24 31 34 4 8	6 36 102 162	FALSE	19 33 16 11 7 3 12 13 6 17 19	51	31	402
433	11	1 2 5 14 22 9 24 31 3 13 11	6 39 102 144	FALSE	23 15 28 7 12 16 12 6 25 18 4	51	44	402
823	12	1 2 5 14 22 9 24 31 34 39 3 4	8 54 174 330	FALSE	18 10 28 11 6 16 7 6 8 8 25 19	58	32	807
830	12	1 2 5 14 22 9 24 31 34 3 11 27	8 55 169 337	FALSE	19 10 30 6 4 15 7 6 8 16 21 4	58	39	807
833	12	1 2 5 14 22 9 24 31 3 25 26 29	8 56 164 344	FALSE	27 10 30 7 6 18 6 7 20 8 11 4	58	42	807
1626	13	1 2 5 14 22 9 24 31 3 25 13 37 8	10 84 270 606	FALSE	23 15 18 6 6 26 12 12 26 7 15 7 4	66	28	1505
3159	14	1 2 5 14 22 9 24 31 34 39 3 6 23 21	14 112 415 1116	FALSE	7 10 28 11 7 16 12 11 4 8 16 27 4 10	75	50	2633
6237	15	1 2 5 14 22 9 24 31 3 25 13 37 15 36 4	21 142 610 1940	FALSE	18 19 18 6 12 16 7 6 26 7 17 12 8 11 8	85	434	4174
15056	16	1 2 5 14 22 9 24 31 15 40 23 30 20 21 28 36	32 168 864 3296	FALSE	27 25 3 11 4 3 13 7 6 10 6 8 11 12 4 13	96	4525	5897
17635	17	1 2 5 14 22 9 24 31 34 39 3 6 23 15 21 18 29	33 242 1254 4846	FALSE	25 10 28 13 12 26 4 11 11 8 20 27 8 4 10 7 7	103	624	6952
26143	18	1 2 5 14 22 9 24 31 3 25 13 37 15 23 26 8 17 21	39 315 1731 7251	FALSE	27 33 29 6 12 18 6 7 16 7 18 12 12 10 10 4 11 4	111	202	6553
42090	19	1 2 5 14 22 9 24 31 3 25 13 17 20 32 27 8 19 4 30	51 389 2304 10737	FALSE	23 37 29 7 6 26 12 11 16 12 15 10 7 6 10 16 10 6 11	120	1668	4590
42304	19	1 2 5 14 22 9 24 31 3 25 13 17 20 32 6 27 34 19 11	51 391 2295 10734	FALSE	18 33 30 12 4 26 12 7 16 8 15 10 8 7 4 8 10 4 15	120	1798	4590
54859	20	1 2 5 14 22 9 24 31 3 25 13 37 15 36 20 26 4 10 23...	60 480 3084 15420	FALSE	27 19 30 7 12 18 6 7 16 6 17 12 8 11 11 8 6 18 8 11	130	1879	4536
54862	20	4 10 11 12 13 18 23 25 26 27 28 29 30 32 33 35 36...	60 480 3084 15420	TRUE	20 1 16 3 1 2 2 9 6 7 6 2 3 5 7 9 3 9 8 1	130	1886	4536
54859	20	6 7 8 11 12 16 17 18 19 21 27 28 30 32 33 34 35 3...	60 480 3084 15420	TRUE	1 3 20 15 2 2 5 4 1 3 2 1 13 13 9 3 4 4 9 5	130	1880	4536
47830	21	4 6 11 12 16 18 19 20 21 25 26 28 29 30 32 33 35 ...	55 386 2253 10804	TRUE	5 2 2 2 13 5 9 2 7 10 5 1 3 3 8 7 1 3 10 1 8	135	752	778
27594	22	6 8 10 11 13 17 19 20 23 26 27 28 29 30 31 32 33 ...	41 310 1714 7314	TRUE	16 3 3 1 4 2 2 5 9 1 7 3 2 9 4 7 12 3 4 4 9 1	138	27	203
27528	22	6 7 8 12 13 16 17 18 21 23 26 27 28 29 32 33 34 3...	41 309 1719 7313	TRUE	1 2 4 1 20 4 3 11 9 2 1 9 2 3 5 10 3 4 1 11 3 5	138	25	203
18335	23	4 7 10 12 13 15 16 17 18 21 23 26 27 28 29 32 33 ...	34 239 1250 4872	TRUE	1 2 1 1 20 5 6 3 11 9 2 1 9 2 8 5 6 3 8 1 8 3 5	139	3	44
15060	24	3 6 7 8 10 12 13 16 17 18 19 20 23 27 28 30 32 33 ...	32 174 855 3242	TRUE	1 21 2 24 22 1 4 2 5 4 2 5 11 2 1 9 11 9 5 4 1 4 9 1	147	9	9
8874	25	3 4 6 7 11 12 13 16 17 19 20 21 23 25 26 28 30 32 ...	26 126 594 2060	TRUE	15 14 1 15 18 24 14 2 2 9 5 1 5 10 2 1 1 9 9 8 8 5 1...	138	3	3

Greedy algorithm experiments

For run size 16, 32 and 81, fix the design A as

- First design for the smallest m
- First design for the largest m

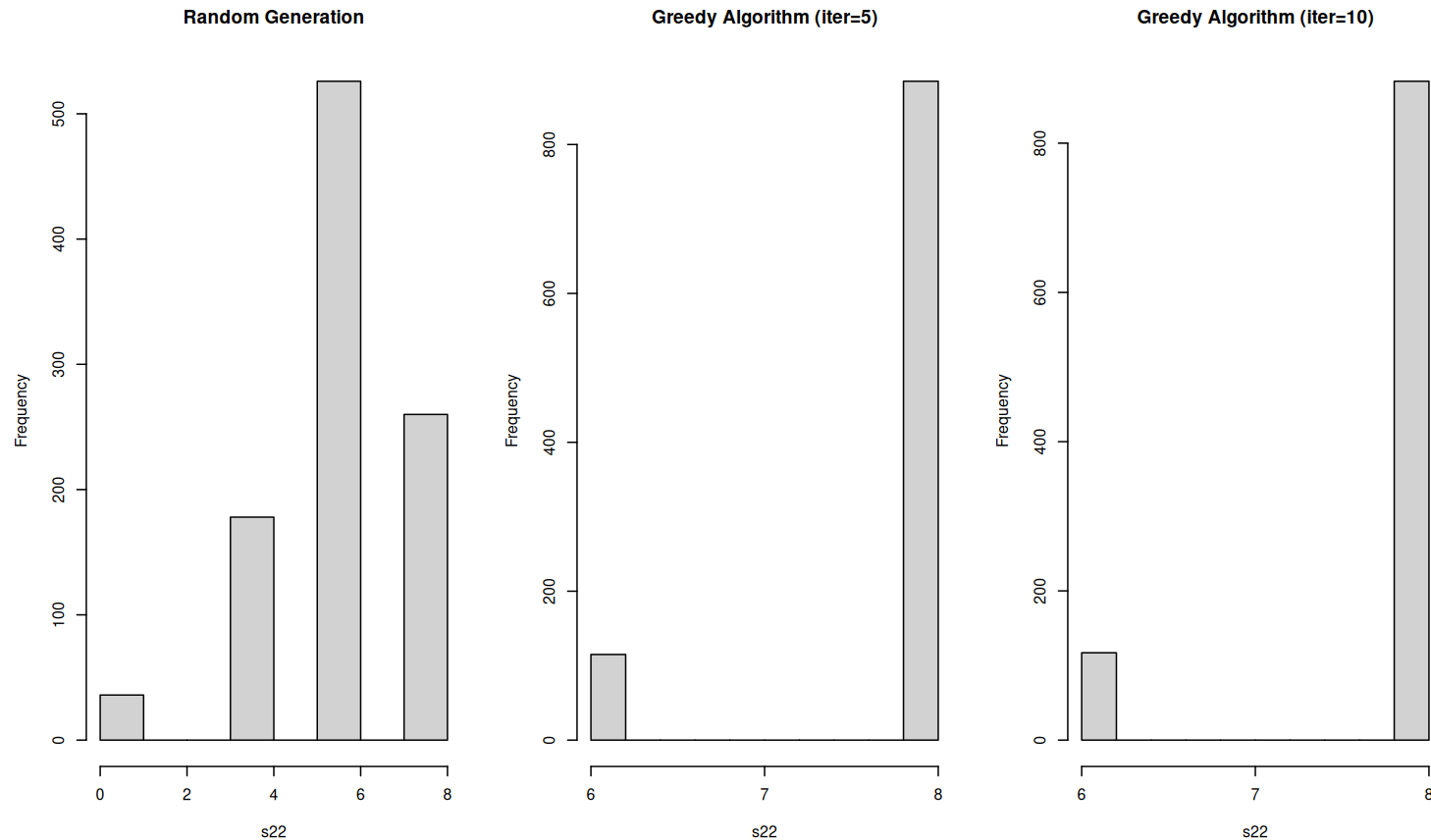
Run the generation for design B 1,000 times with

1. Random generation
2. Greedy algorithm with 5 iterations
3. Greedy algorithm with 10 iterations

Plot the frequencies of s_{22} as histograms.

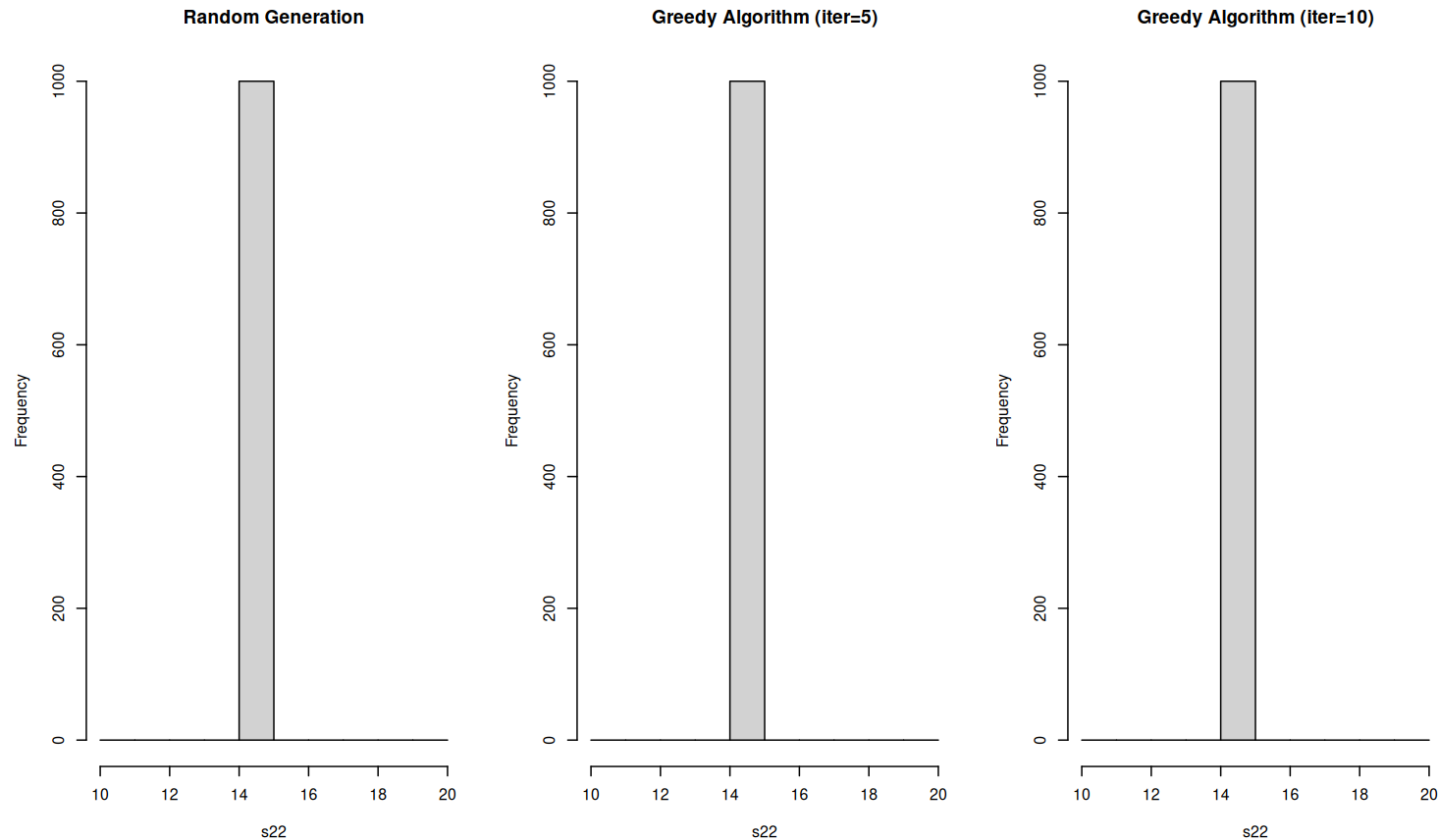
Greedy algorithm experiments

16 runs, $m=6$, columns=(1, 2, 4, 8, 7, 11).



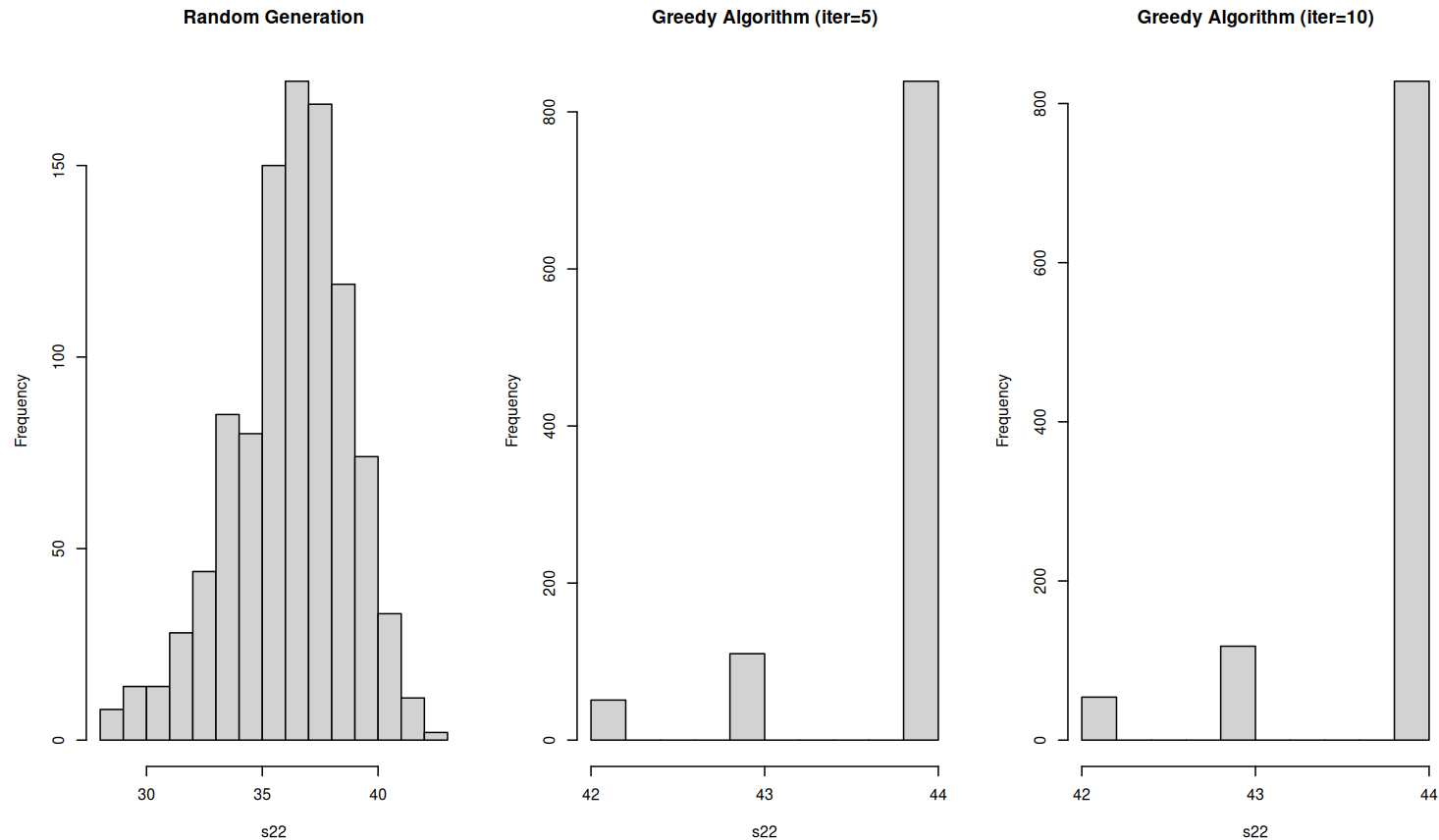
Greedy algorithm experiments

16 runs, $m=10$, columns=(3, 5, 6, 7, 9, 10, 11, 12, 13, 14).



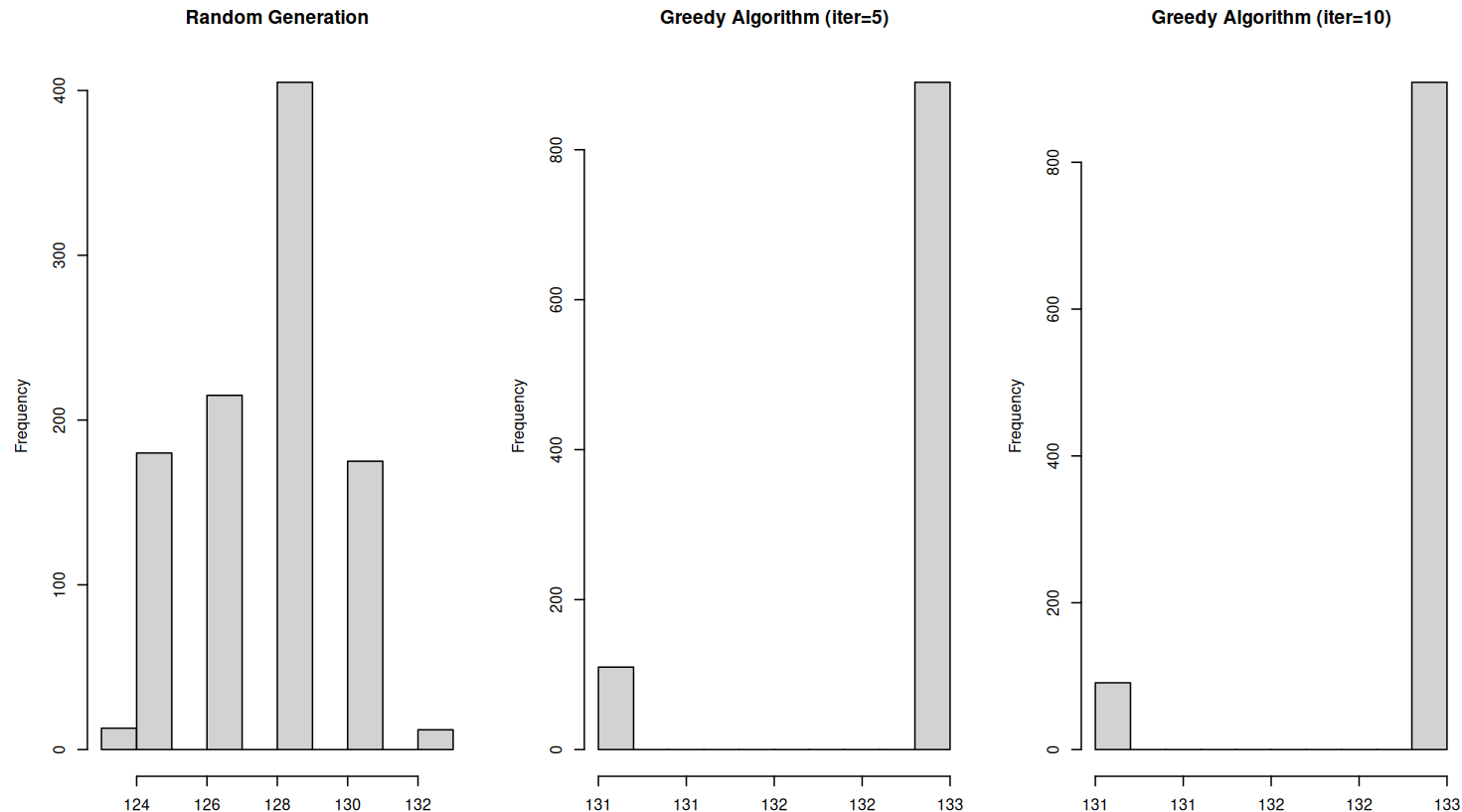
Greedy algorithm experiments

32 runs, $m=10$, columns=(1,2, 4, 8, 16, 15, 19, 21, 25, 30).



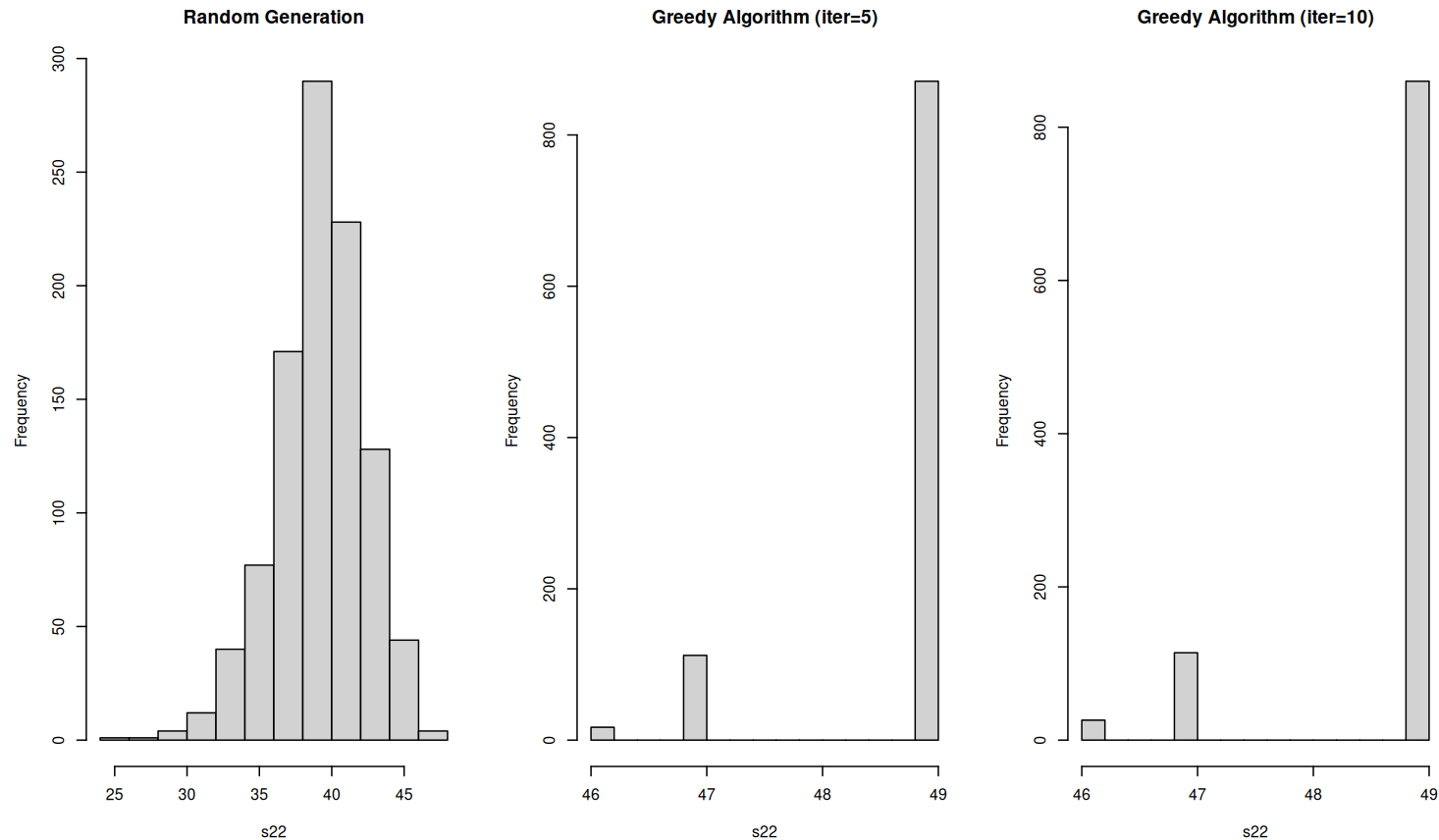
Greedy algorithm experiments

32 runs, $m=22$, columns=(3, 5, 6, 7, 9, 10, 11, 12, 13, 14, 17, 18, 20, 23, 24, 25, 26, 27, 28, 29, 30, 31).



Greedy algorithm experiments

81 runs, $m=11$, columns=(1, 2, 5, 14, 22, 9, 24, 31, 34, 39, 3).



Greedy algorithm experiments

81 runs, $m=25$, columns=(4, 6, 7, 8, 11, 13, 15, 16, 17, 18, 19, 20, 21, 23, 25, 26, 28, 32, 33, 35, 36, 37, 38, 39, 40).

