2D Linear Model Selection

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7/26/2019

Example 1

Compare Example 1 MEDs to Other Designs

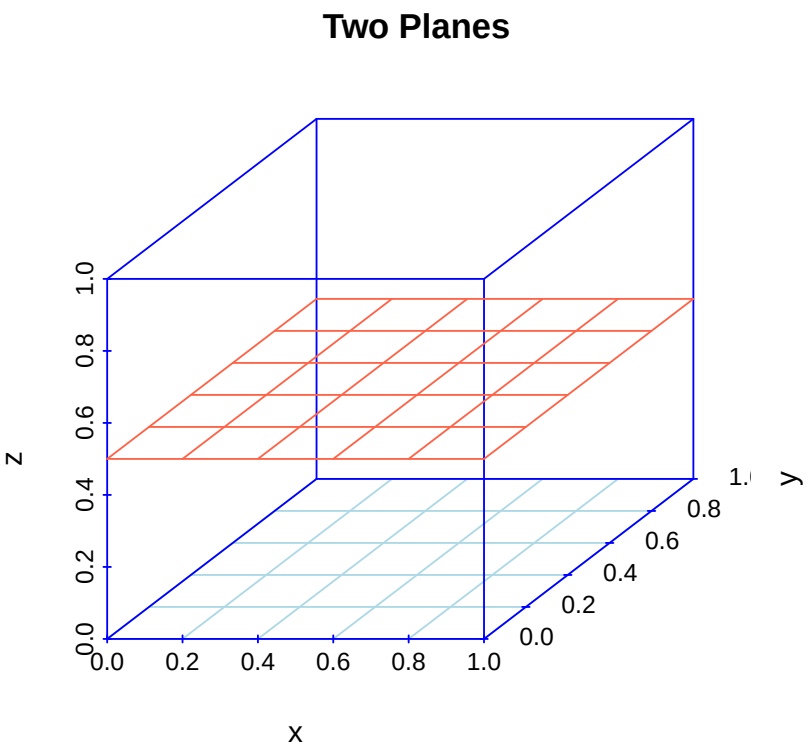
Example 2

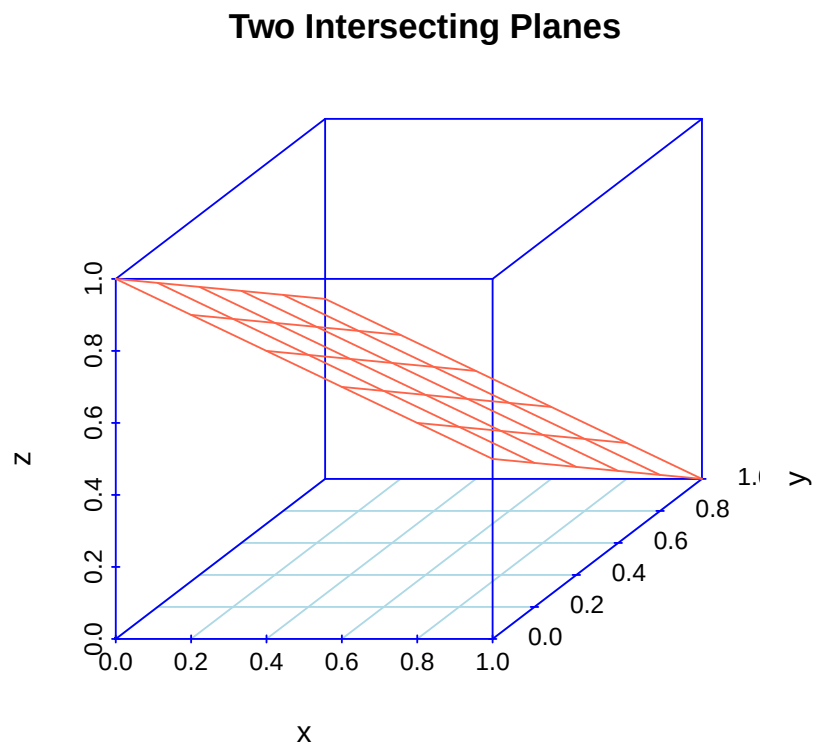
Compare Example 2 MEDs to Other Designs

See Behavior of Candidate Sets in Example 2 Fast MED, N = 300

Experiments

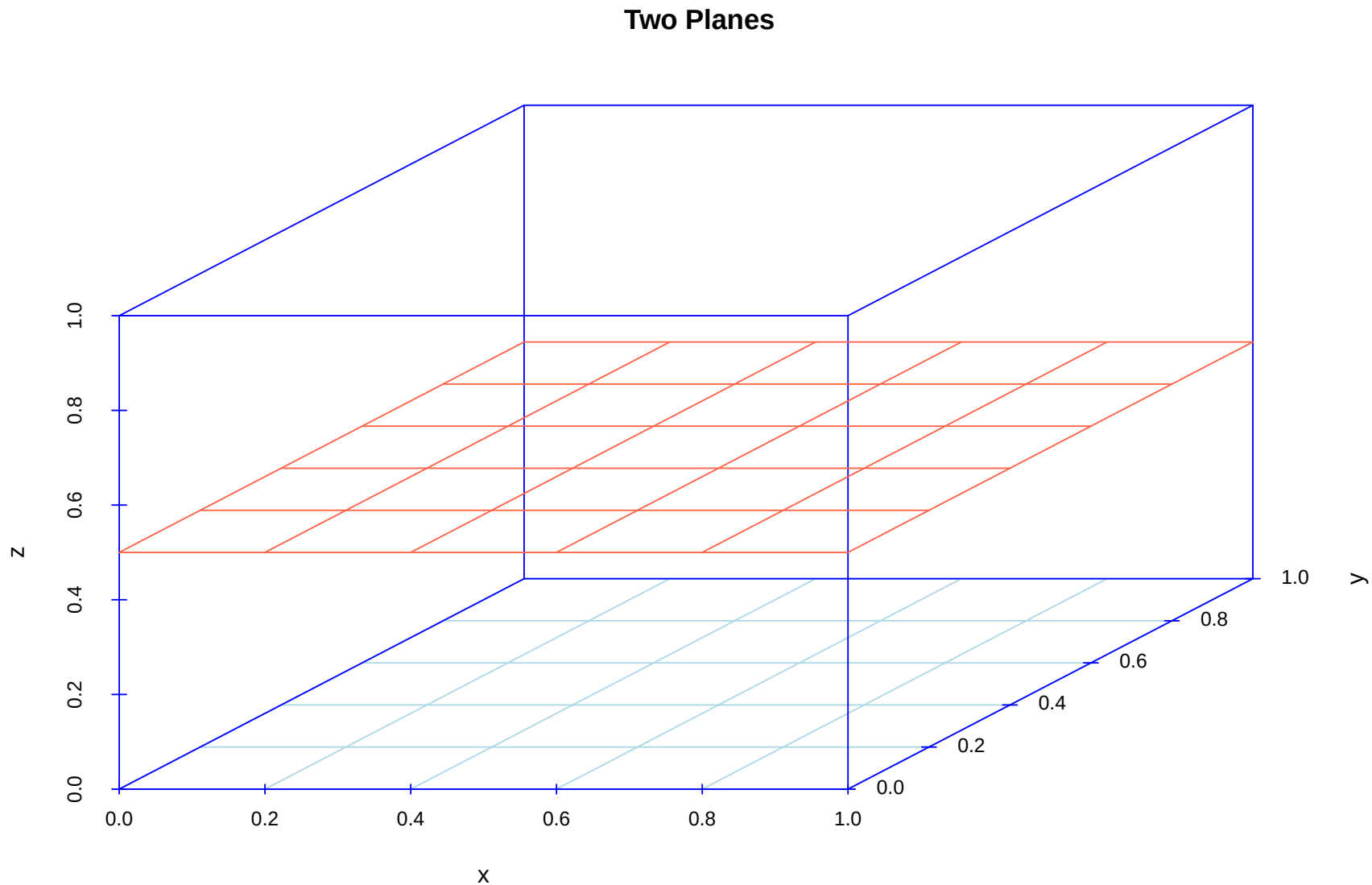
Here I consider two examples in which two different models are compared:



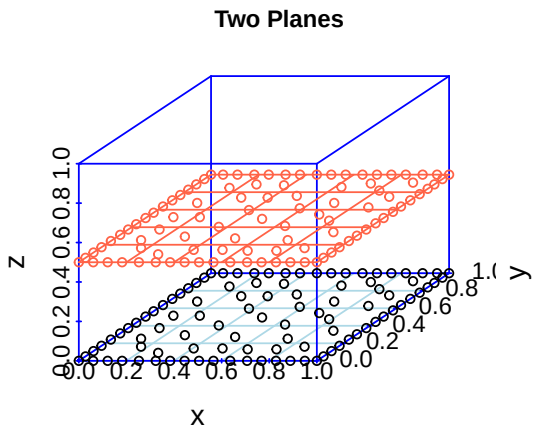


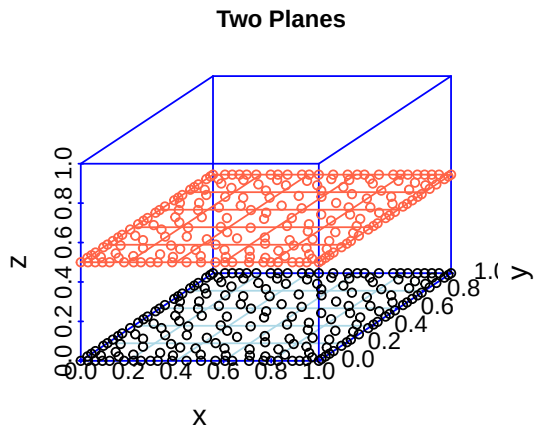
Example 1

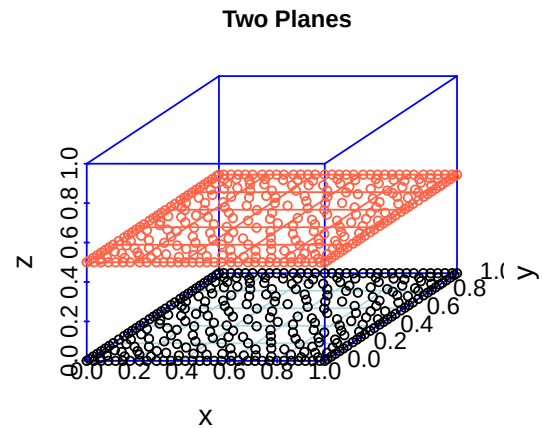
Example 1

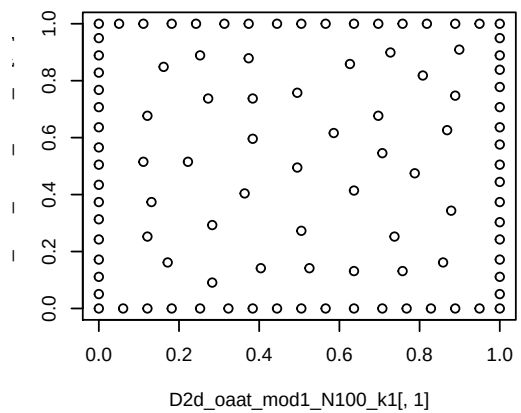


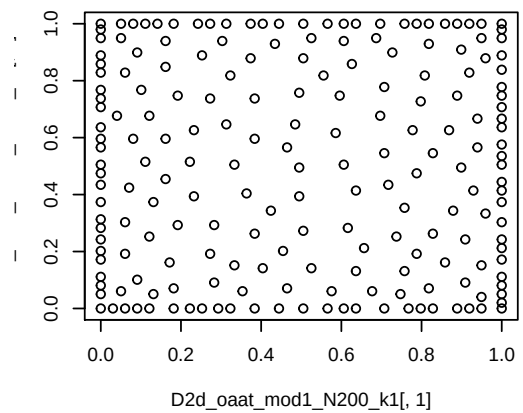
One-at-a-Time Algorithm, k = 1, N = 100, 200, 300

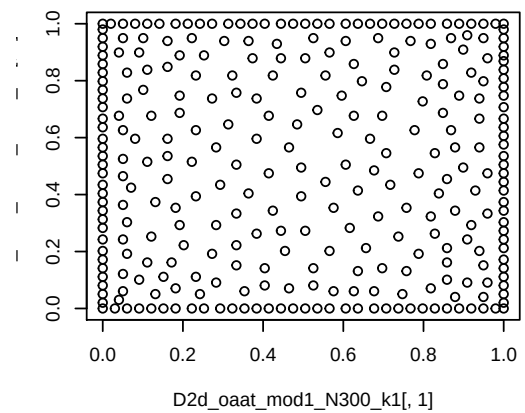


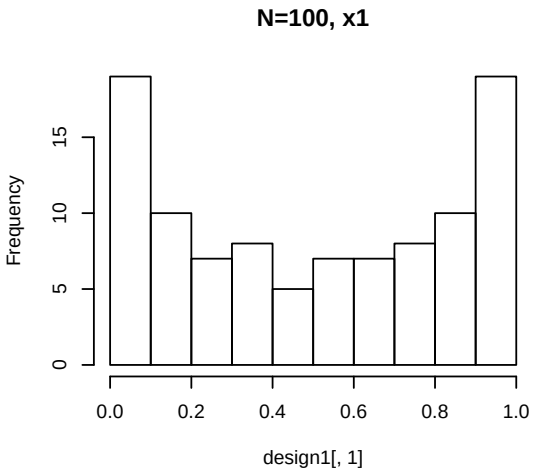








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Frequency
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5
10
15
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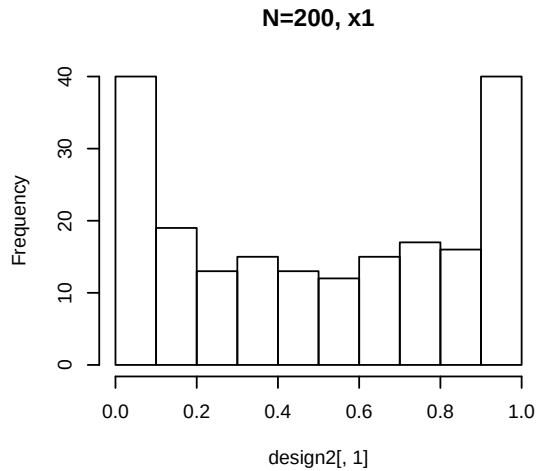
0.2
0.4
0.6
0.8
1.0
design1[, 1]


N=200, x1
Frequency
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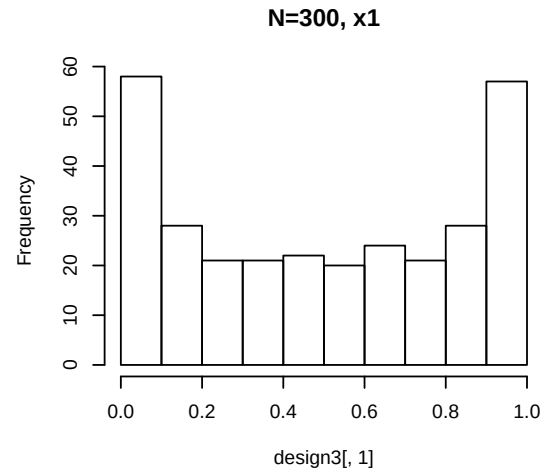
20
30
40
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 1]


N=300, x1
Frequency
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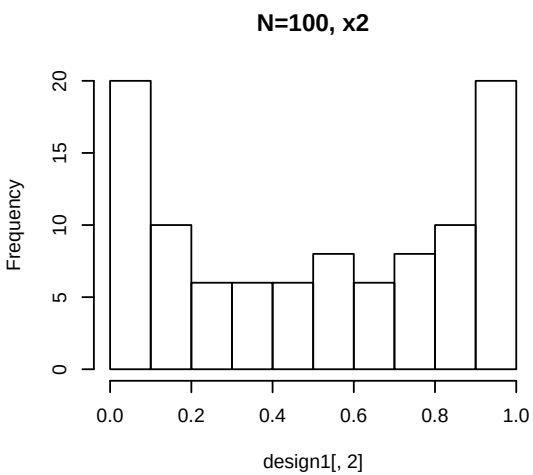
0.2
0.4
0.6
0.8
1.0
design3[, 1]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Frequency
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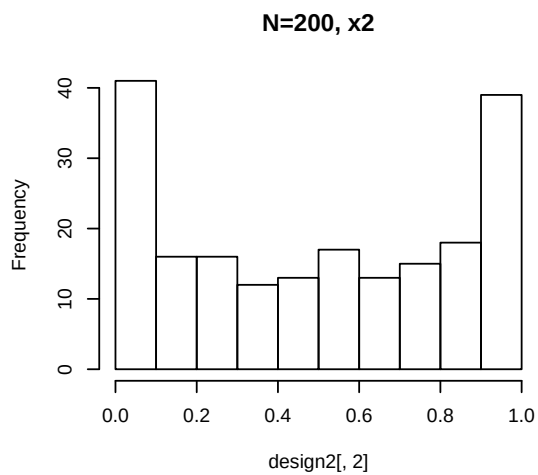
15
20
0.0
0.2
0.4
0.6
0.8
1.0
design1[, 2]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20
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40
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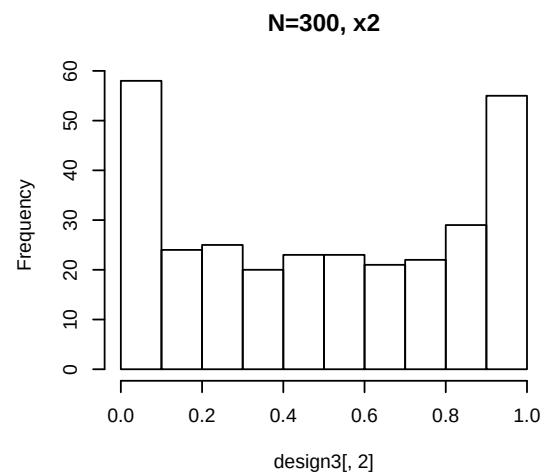
0.2
0.4
0.6
0.8
1.0
design2[, 2]


N=300, x2
Frequency
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40
50
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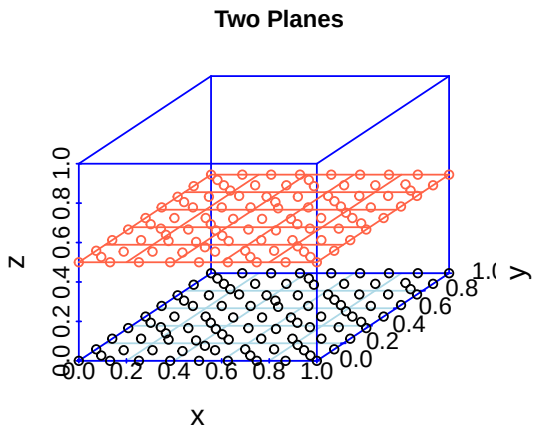
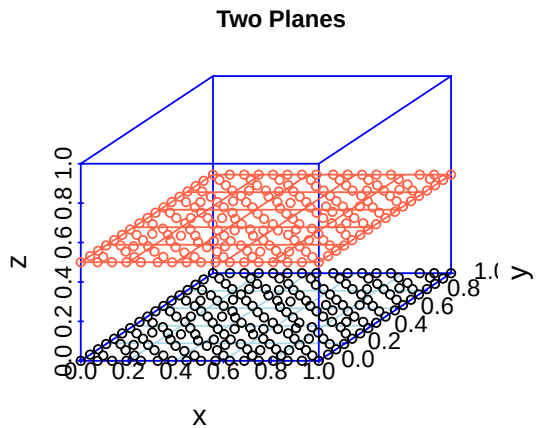
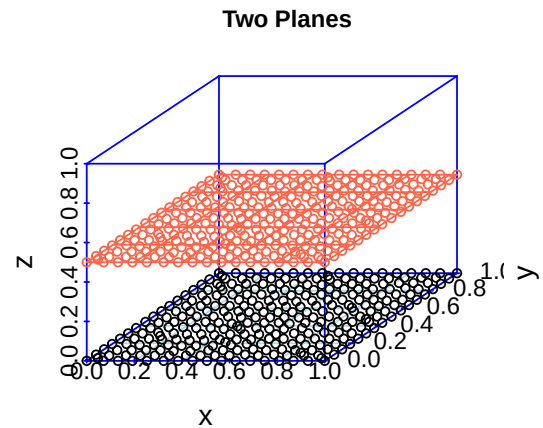
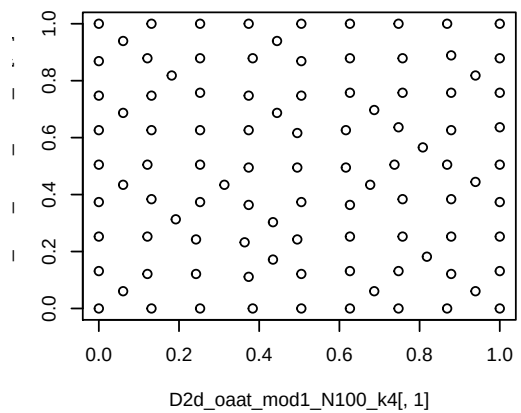
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 2]

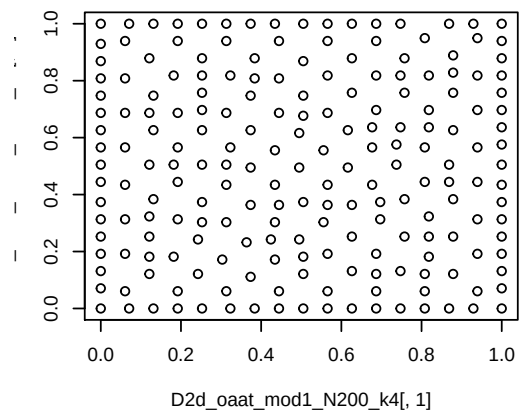
One-at-a-Time Algorithm, k = 4, N = 100, 200, 300

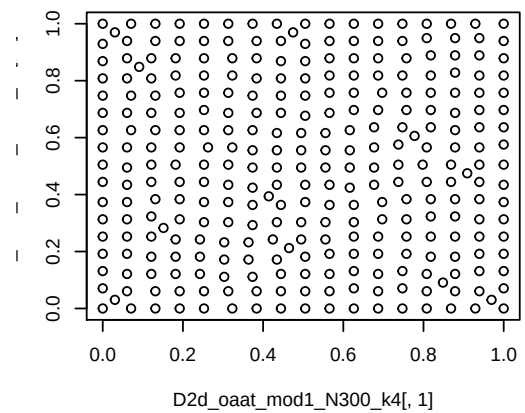


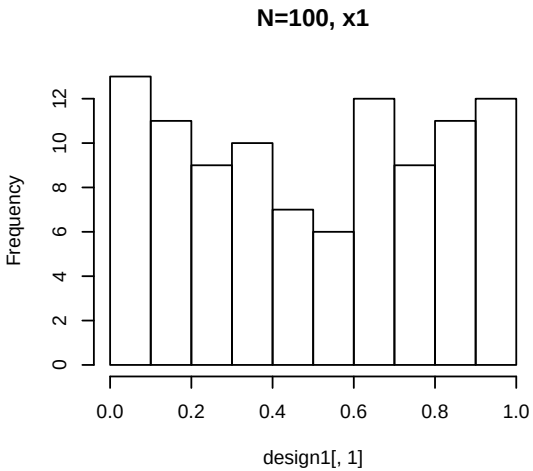











N=100, x1
Frequency
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4
6
8
10
12
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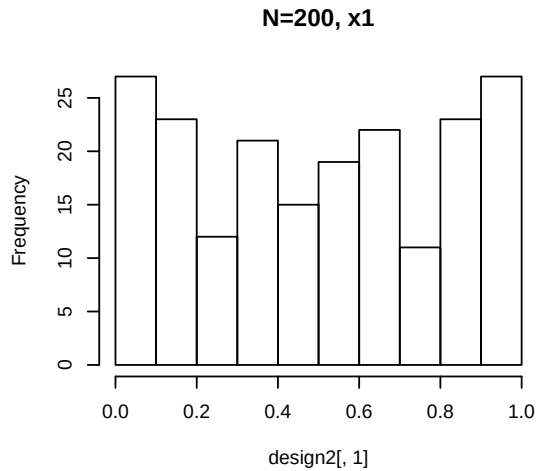
0.2
0.4
0.6
0.8
1.0
design1[, 1]


N=200, x1
Frequency
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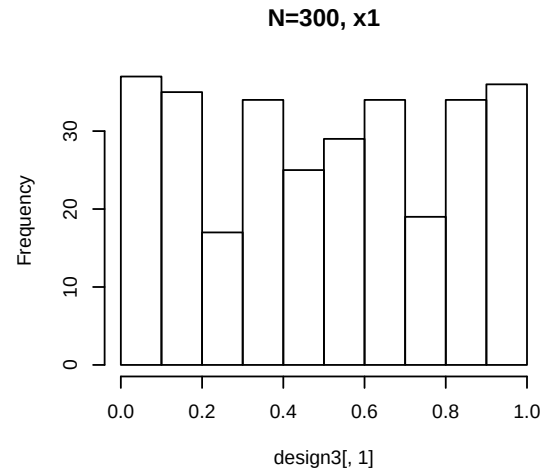
10
15
20
25
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 1]


N=300, x1
Frequency
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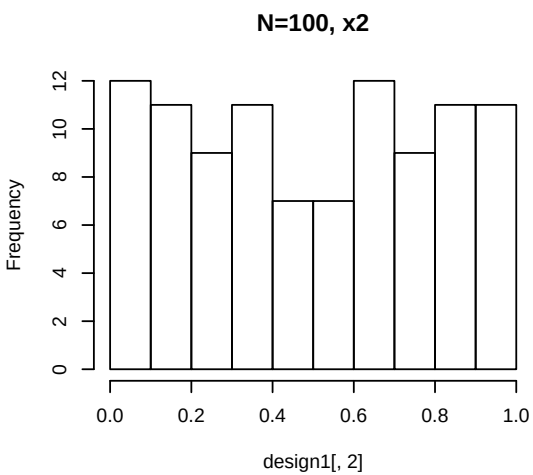
30
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 1]


N=100, x2
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12
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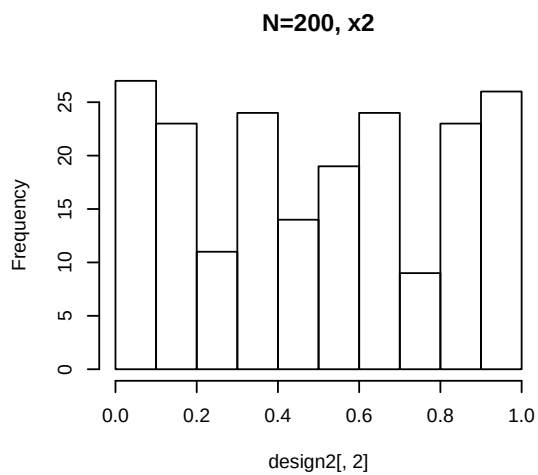
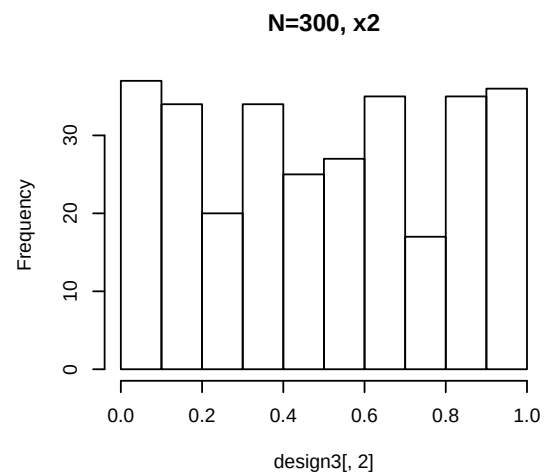
0.4
0.6
0.8
1.0
design1[, 2]


N=200, x2
Frequency
0
5
10
15
20
25
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 2]


N=300, x2
Frequency
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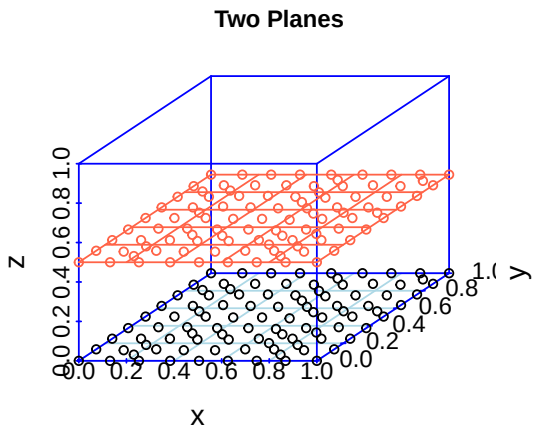
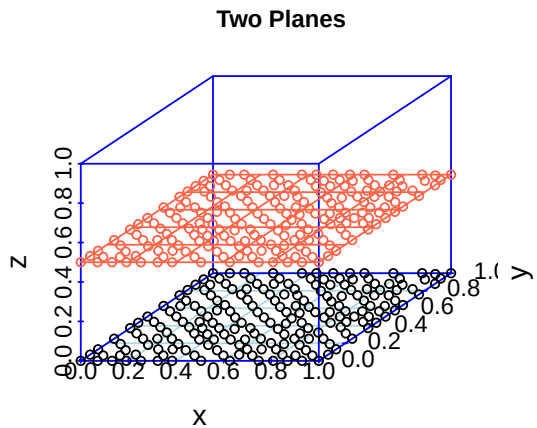
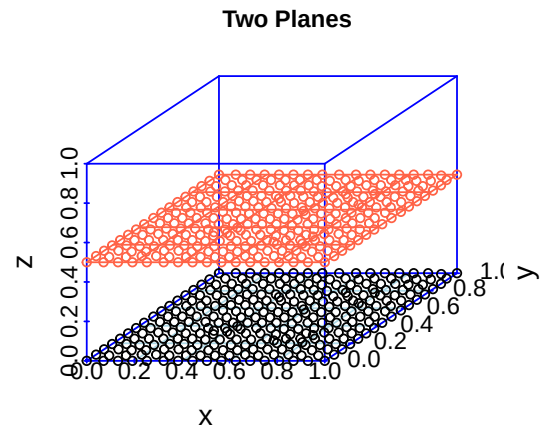
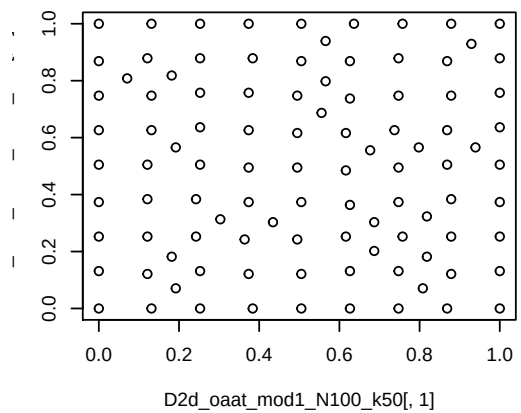
30
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 2]

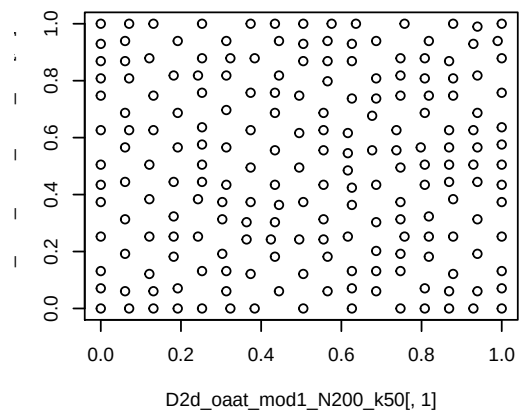
One-at-a-Time Algorithm, k = 50, N = 100, 200, 300

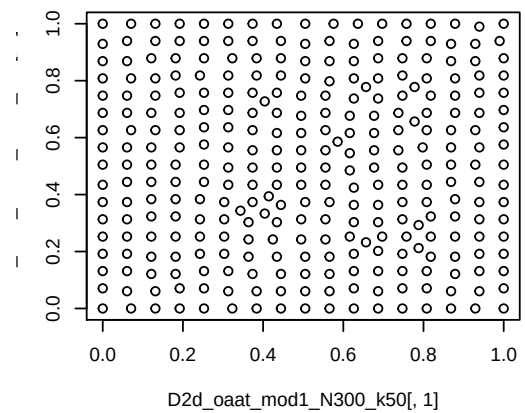


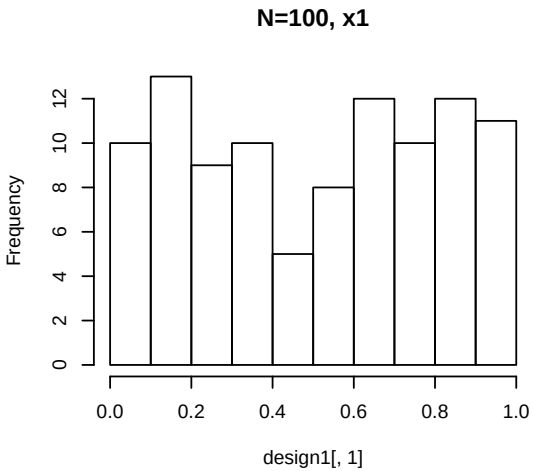











N=100, x1
Frequency
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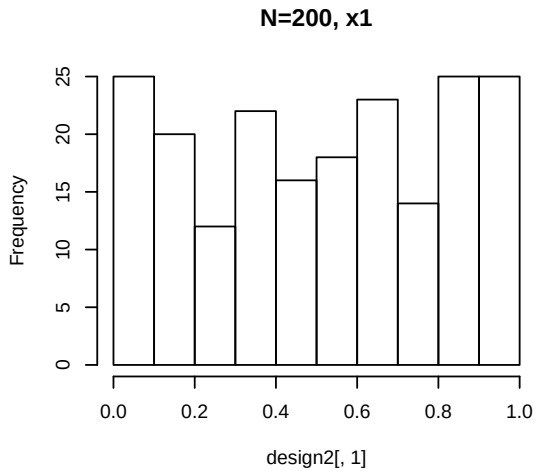
8
10
12
0.0
0.2
0.4
0.6
0.8
1.0
design1[, 1]


N=200, x1
Frequency
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10
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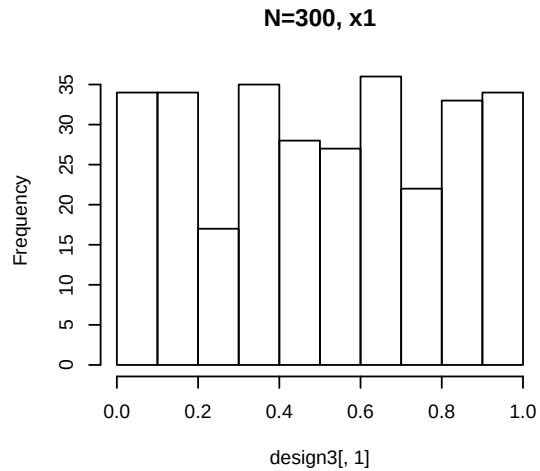
20
25
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 1]


N=300, x1
Frequency
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20
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0.2
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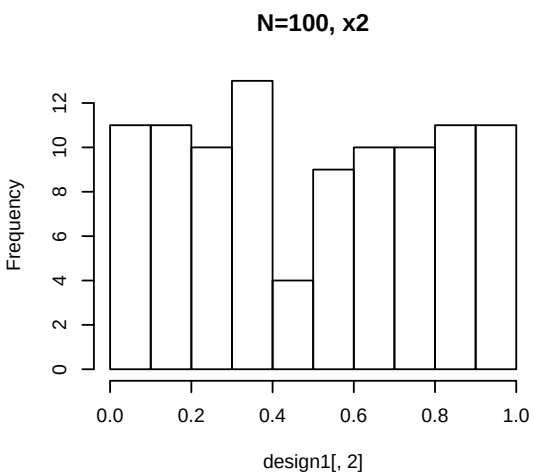
0.6
0.8
1.0
design3[, 1]


N=100, x2
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6
8
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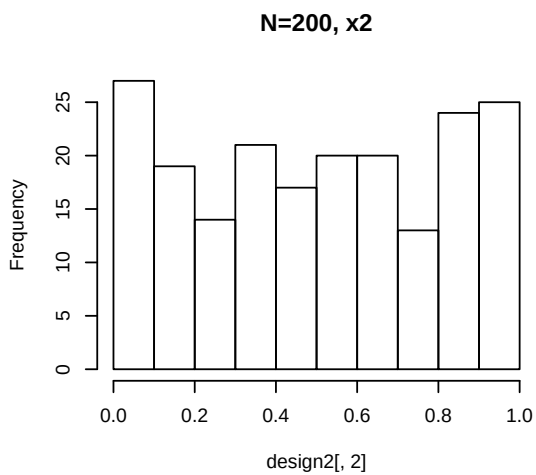
0.2
0.4
0.6
0.8
1.0
design1[, 2]


N=200, x2
Frequency
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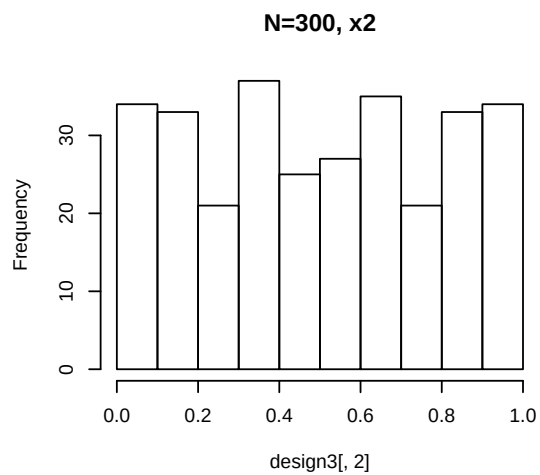
0.4
0.6
0.8
1.0
design2[, 2]


N=300, x2
Frequency
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30
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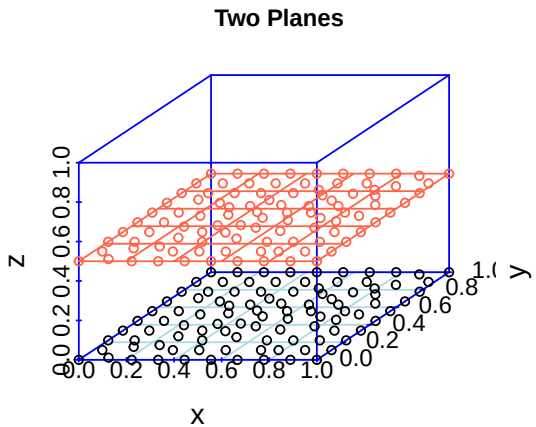
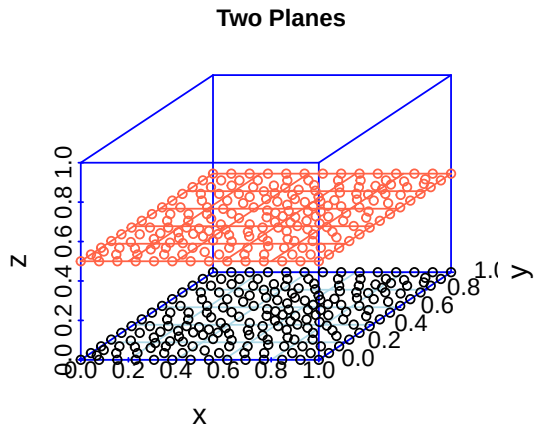
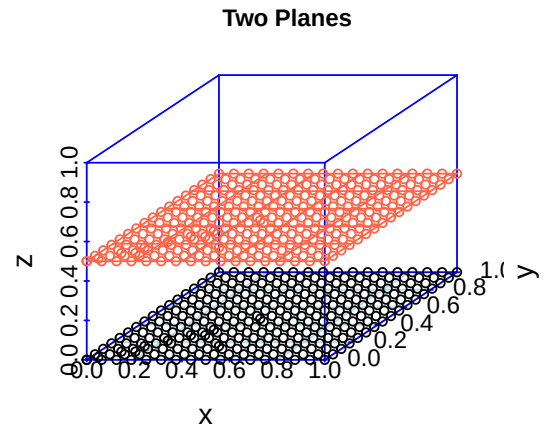
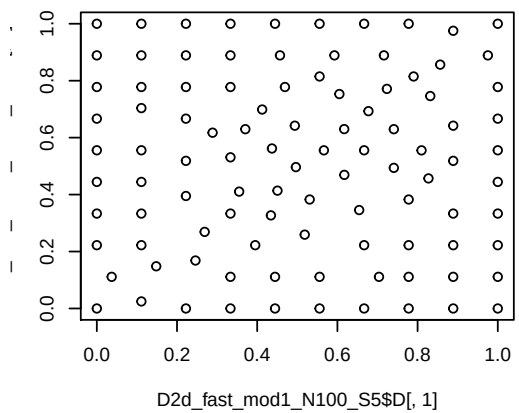
0.4
0.6
0.8
1.0
design3[, 2]

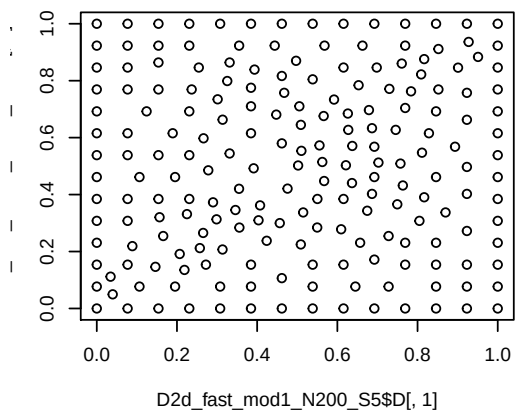
Fast Algorithm, S = 5, N = 100, 200, 300

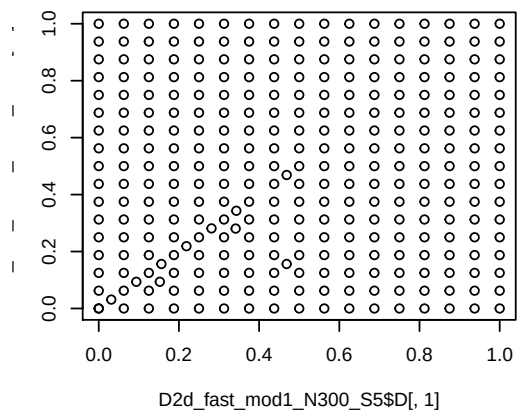


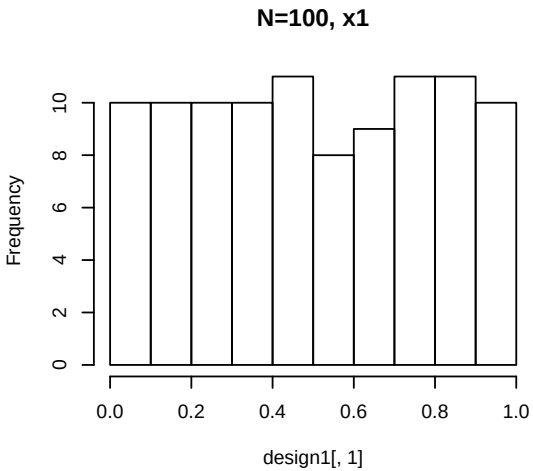


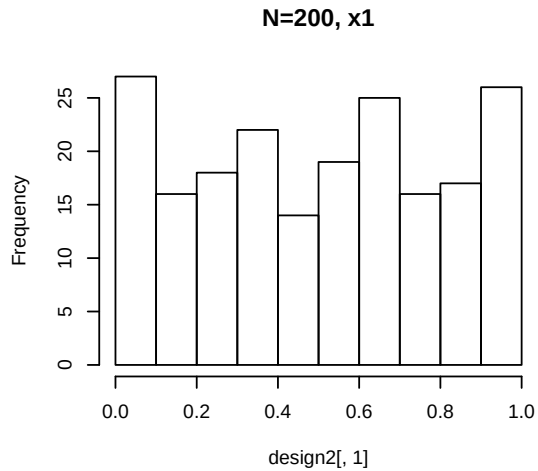


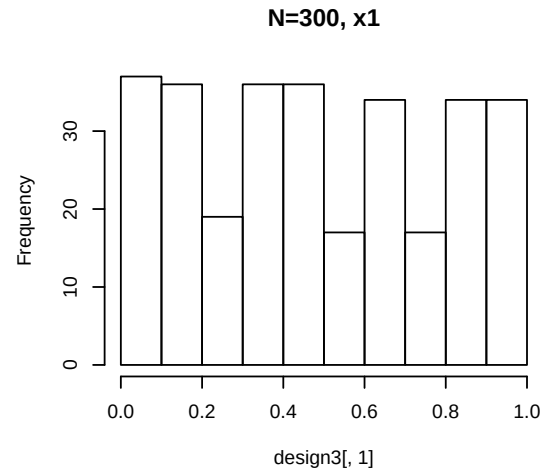


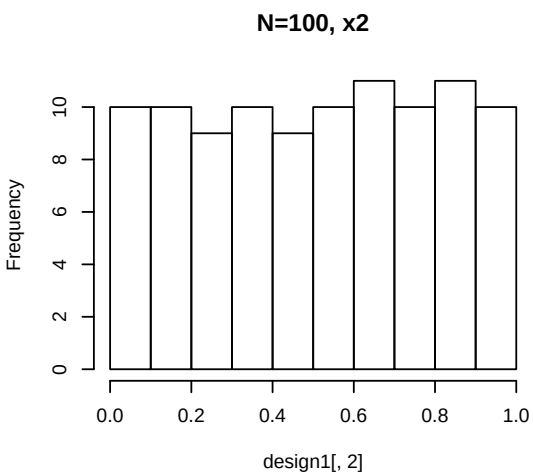


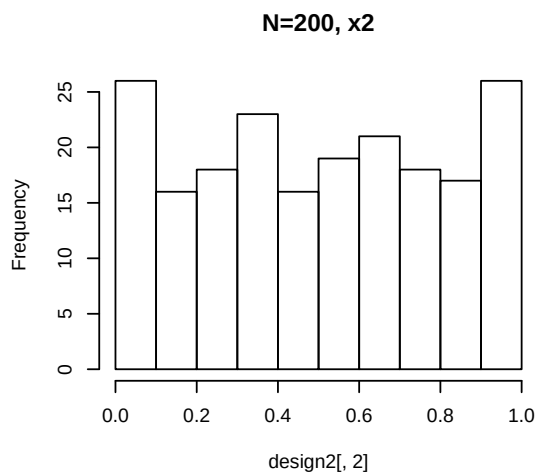


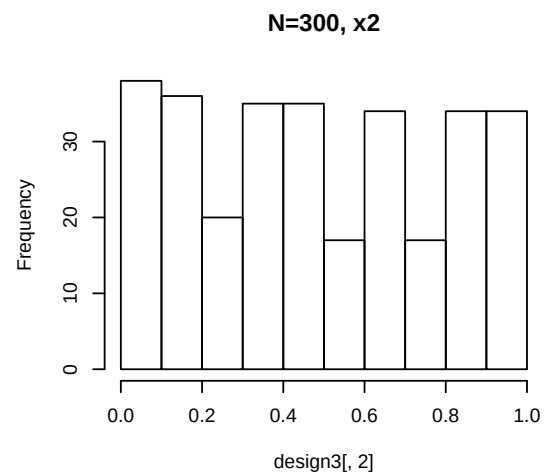

N=100, x1
Frequency
0
2
4
6
8
10
0.0
0.2
0.4
0.6
0.8
1.0
design1[, 1]


N=200, x1
Frequency
0
5
10
15
20
25
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 1]


N=300, x1
Frequency
0
10
20
30
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 1]


N=100, x2
Frequency
0
2
4
6
8
10
0.0
0.2
0.4
0.6
0.8
1.0
design1[, 2]


N=200, x2
Frequency
0
5
10
15
20
25
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 2]


N=300, x2
Frequency
0
10
20
30
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 2]

Example 1 Evaluations, N = 100

	1atT,k=1	1atT,k=4	1atT,k=50	Fast,S=5
TPEx10e-3	13.903	14.892	15.103	15.083
Fast Crit	24.946	14.7	14.7	17.009
1atT Crit (k=4)	61.838	48.316	48.542	47.595
Mean(D)[1]	0.50313	0.49717	0.50889	0.50076
Mean(D)[2]	0.50505	0.49616	0.49707	0.50746
sd(D)[1]	0.36469	0.32293	0.31636	0.31552
sd(D)[2]	0.3678	0.31889	0.31681	0.31505
V[B0|Y,X]	0.000791	0.000885	0.000902	0.000915
V[B1|Y,X]	0.0013	0.00152	0.00156	0.00156
V[B2|Y,X]	0.00128	0.00154	0.00156	0.00156

Example 1 Evaluations, N = 200

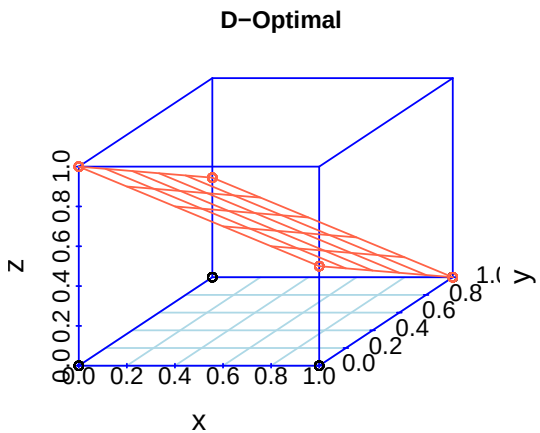
	1atT,k=1	1atT,k=4	1atT,k=50	Fast,S=5
TPEx10e-3	59.56	62.211	63.801	64.487
Fast Crit	62.366	24.462	20.789	26.41
1atT Crit (k=4)	124.21	84.365	85.319	84.587
Mean(D)[1]	0.49995	0.49985	0.51086	0.49963
Mean(D)[2]	0.50051	0.49561	0.50131	0.50103
sd(D)[1]	0.35612	0.32049	0.31099	0.30777
sd(D)[2]	0.35582	0.31835	0.31336	0.30804
V[B0|Y,X]	0.000487	0.000548	0.000574	0.000559
V[B1|Y,X]	0.000796	0.00094	0.000982	0.00101
V[B2|Y,X]	0.000797	0.00095	0.000973	0.001

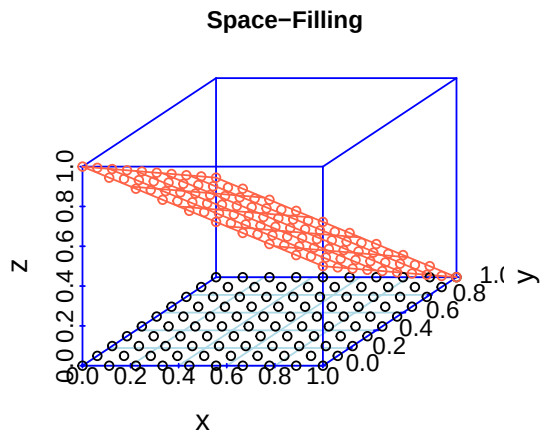
Example 1 Evaluations, N = 300

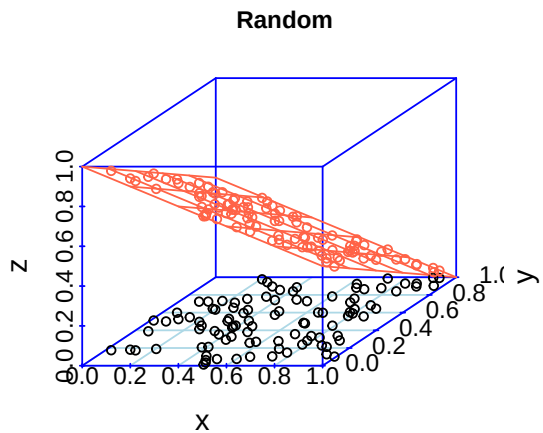
	1atT,k=1	1atT,k=4	1atT,k=50	Fast,S=5
TPEx10e-3	137.15	146.52	148.88	Inf
Fast Crit	62.366	29.4	29.4	Inf
1atT Crit (k=4)	156.82	112.4	112.79	Inf
Mean(D)[1]	0.49939	0.49939	0.503	0.49019
Mean(D)[2]	0.49993	0.49869	0.49956	0.48875
sd(D)[1]	0.35166	0.30818	0.30294	0.30666
sd(D)[2]	0.35044	0.30979	0.30329	0.30761
V[B0|Y,X]	0.000354	0.000418	0.00043	0.000398
V[B1|Y,X]	0.000579	0.000723	0.000743	0.000732
V[B2|Y,X]	0.000583	0.000717	0.000742	0.000728

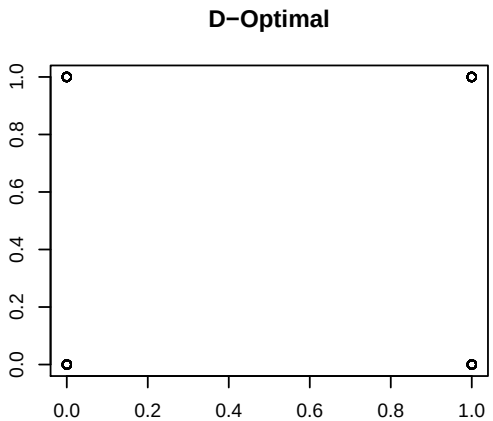
Compare Example 1 MEDs to Other Designs

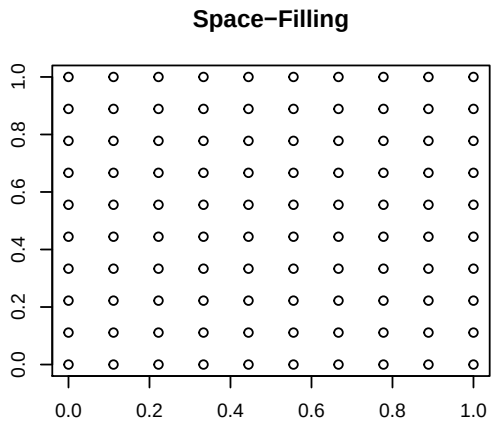
Other Designs, N = 100

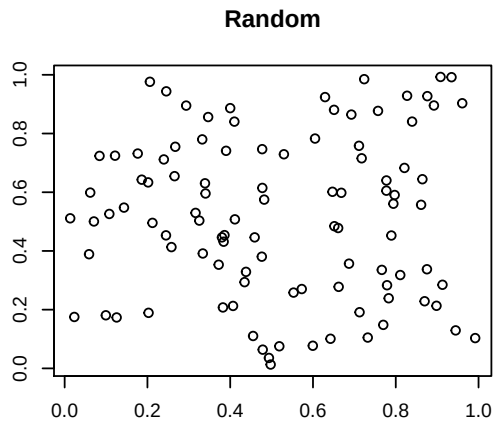


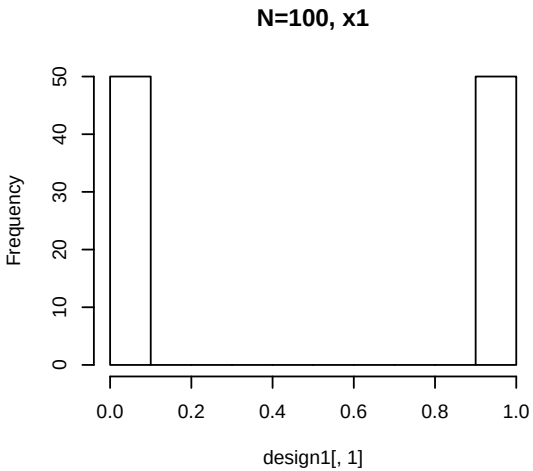


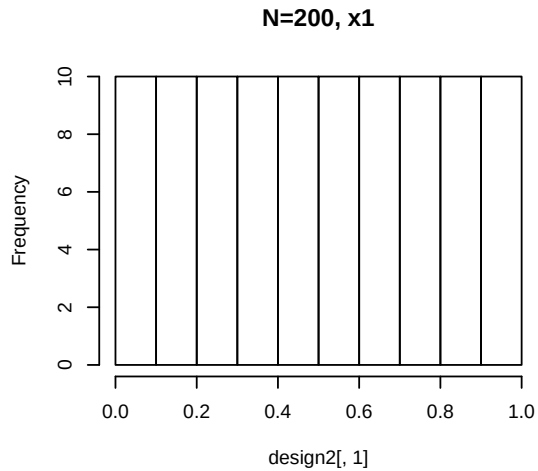


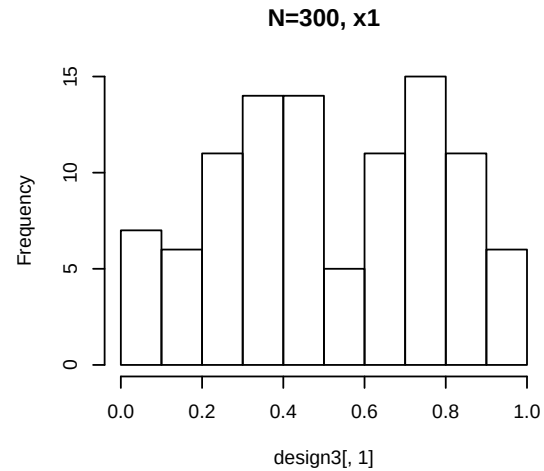


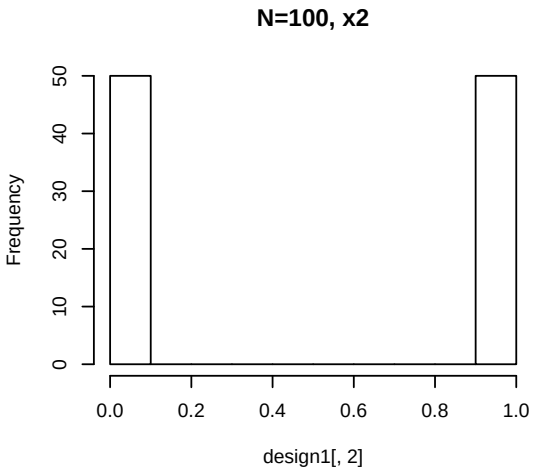


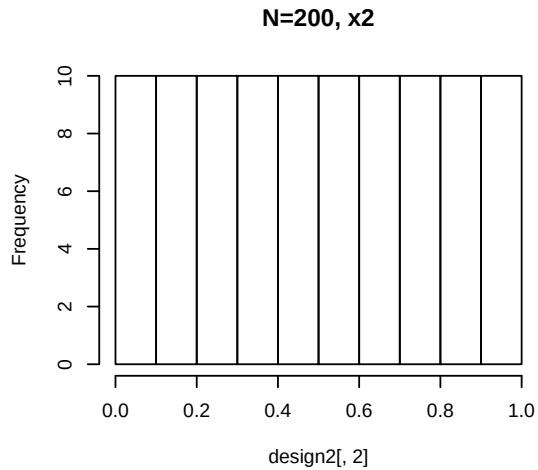


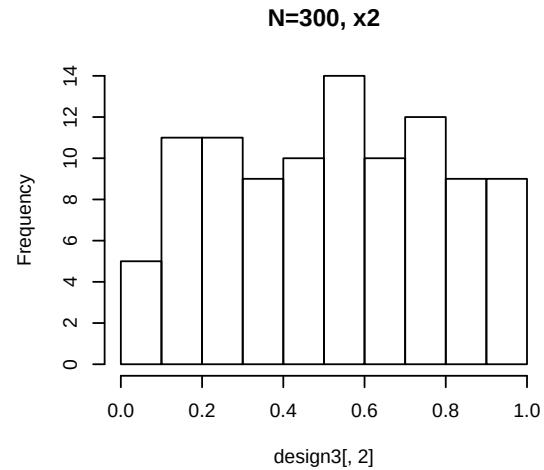

N=100, x1
Frequency
0
10
20
30
40
50
0.0
0.2
0.4
0.6
0.8
1.0
design1[, 1]


N=200, x1
Frequency
0
2
4
6
8
10
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 1]


N=300, x1
Frequency
0
5
10
15
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 1]


N=100, x2
Frequency
0
10
20
30
40
50
0.0
0.2
0.4
0.6
0.8
1.0
design1[, 2]


N=200, x2
Frequency
0
2
4
6
8
10
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 2]

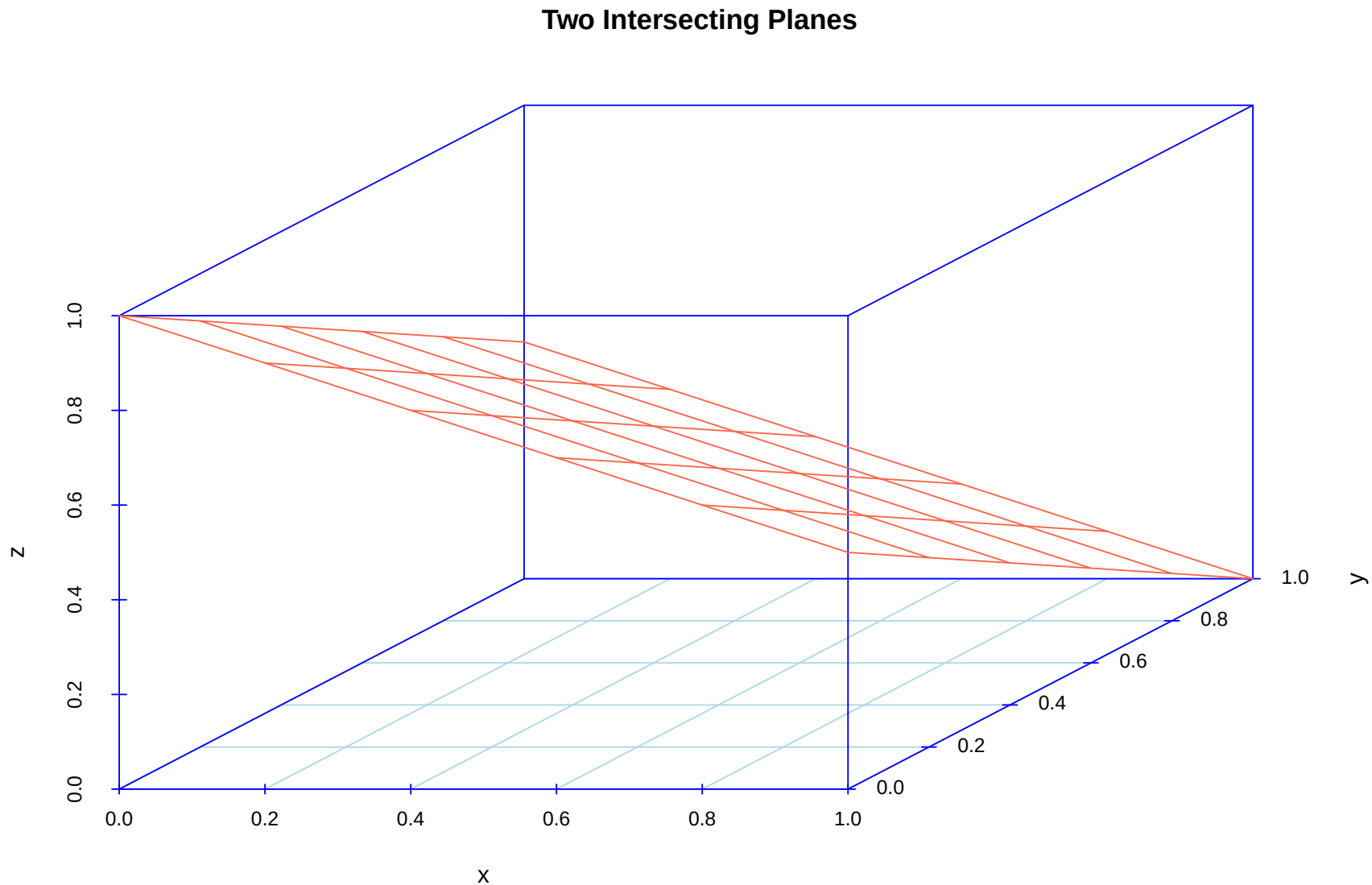

N=300, x2
Frequency
0
2
4
6
8
10
12
14
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 2]

Example 1 Evaluations for Other Designs, N = 100

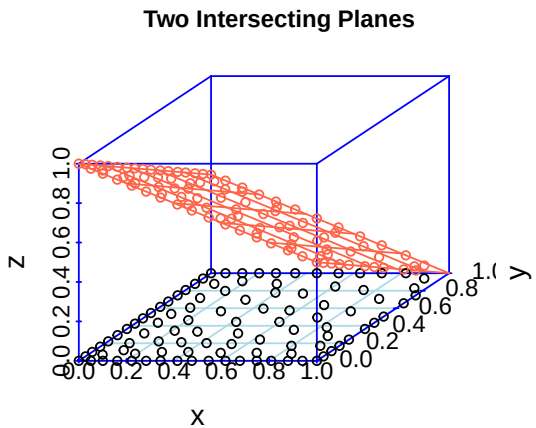
	1atT,k=1	1atT,k=4	1atT,k=50	Fast,S=5	D-Opt	Space	Random
TPEx10e-3	13.903	14.892	15.103	15.083	Inf	14.778	19.295
Fast Crit	24.946	14.7	14.7	17.009	Inf	11.339	129.35
1atT Crit (k=4)	61.838	48.316	48.542	47.595	Inf	45.241	158.09
Mean(D)[1]	0.50313	0.49717	0.50889	0.50076	0.5	0.5	0.51785
Mean(D)[2]	0.50505	0.49616	0.49707	0.50746	0.5	0.5	0.51747
sd(D)[1]	0.36469	0.32293	0.31636	0.31552	0.50252	0.32075	0.26758
sd(D)[2]	0.3678	0.31889	0.31681	0.31505	0.50252	0.32075	0.27182
V[B0|Y,X]	0.000791	0.000885	0.000902	0.000915	0.000588	0.000884	0.00106
V[B1|Y,X]	0.0013	0.00152	0.00156	0.00156	0.000803	0.00153	0.00189
V[B2|Y,X]	0.00128	0.00154	0.00156	0.00156	0.000803	0.00153	0.00186

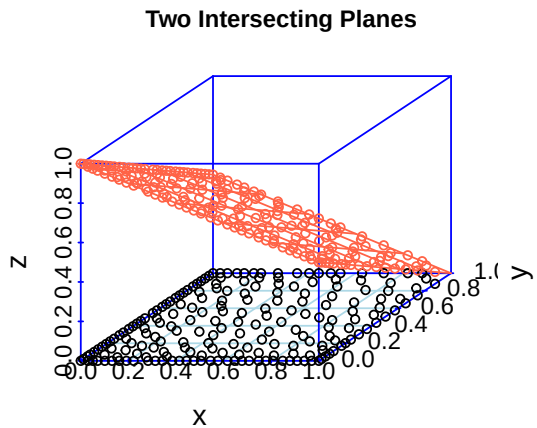
Example 2

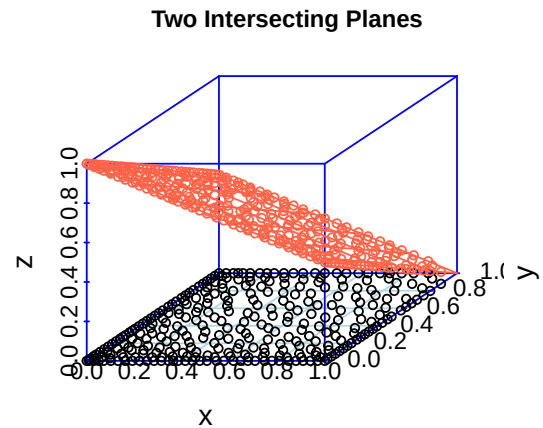
Example 2

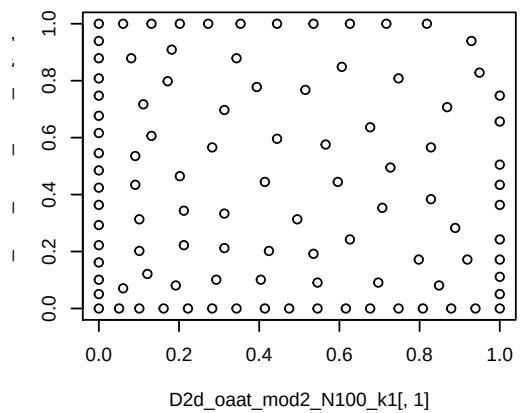

Two Intersecting Planes
z
0.0
0.2
0.4
0.6
0.8
1.0
x
0.0
0.2
0.4
0.6
0.8
1.0
y
0.0
0.2
0.4
0.6
0.8
1.0

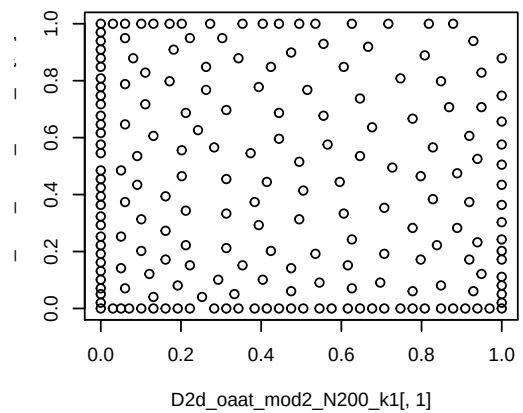
One-at-a-Time Algorithm, k = 1, N = 100, 200, 300

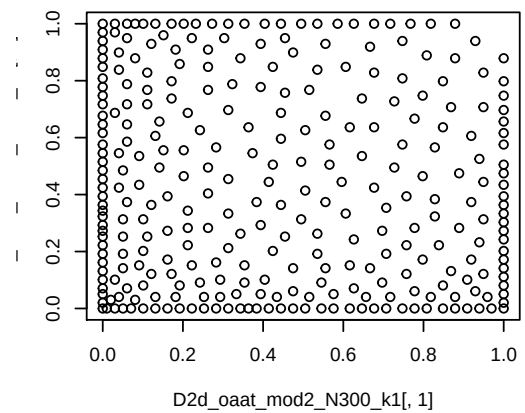


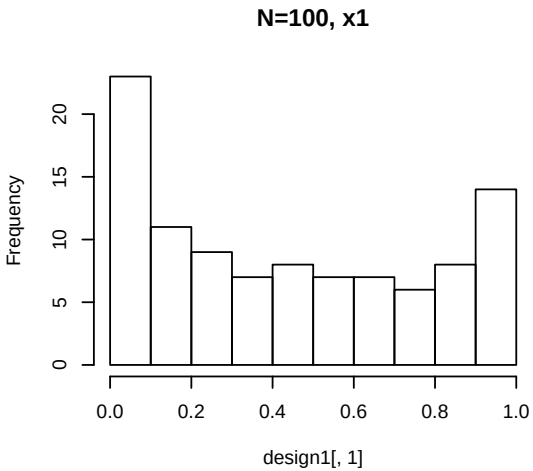


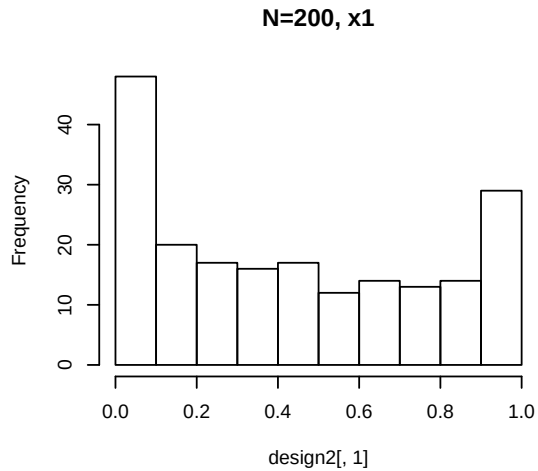


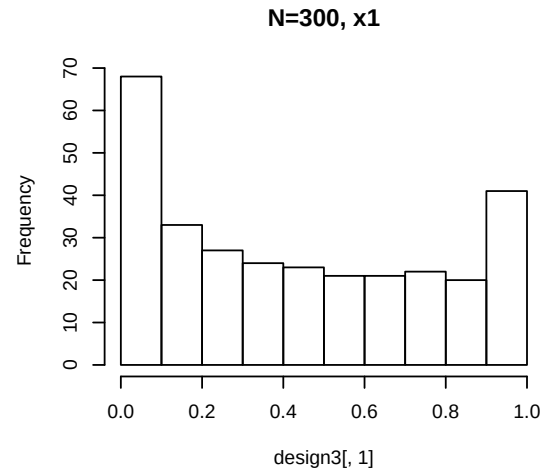


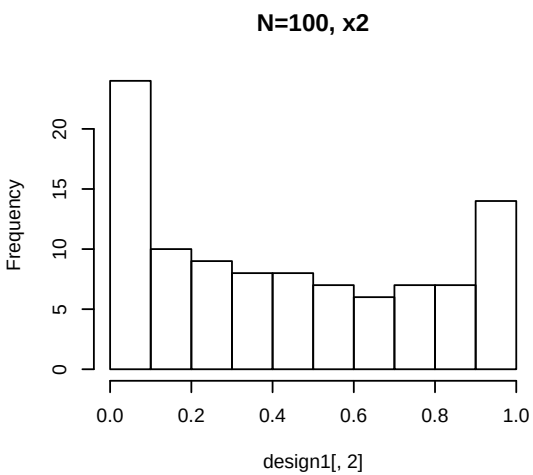


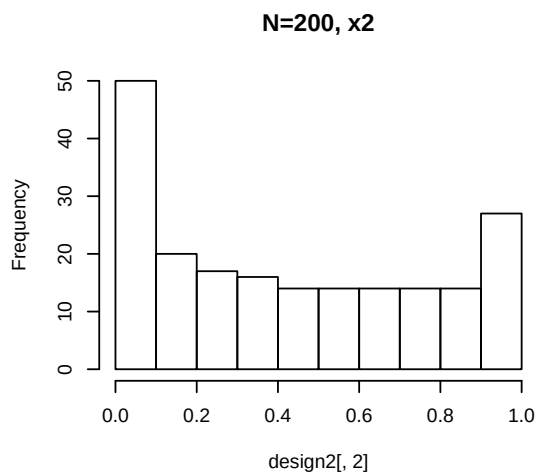


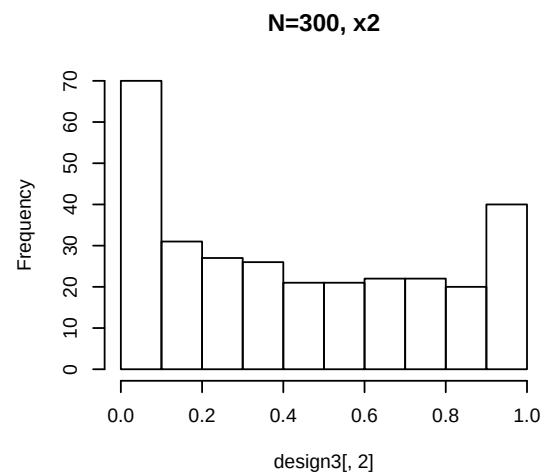

N=100, x1
Frequency
0
5
10
15
20
0.0
0.2
0.4
0.6
0.8
1.0
design1[, 1]


N=200, x1
Frequency
0
10
20
30
40
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 1]

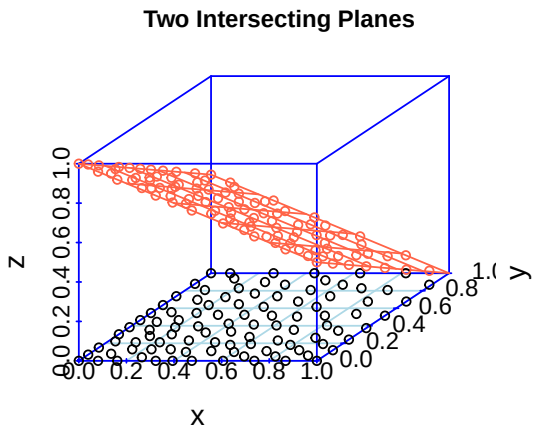

N=300, x1
Frequency
0
10
20
30
40
50
60
70
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 1]

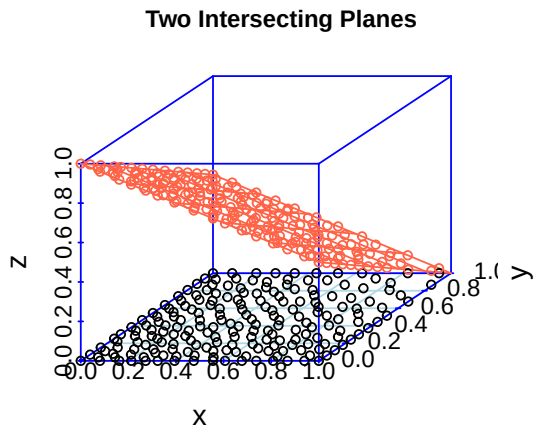

N=100, x2
Frequency
0
5
10
15
20
0.0
0.2
0.4
0.6
0.8
1.0
design1[, 2]

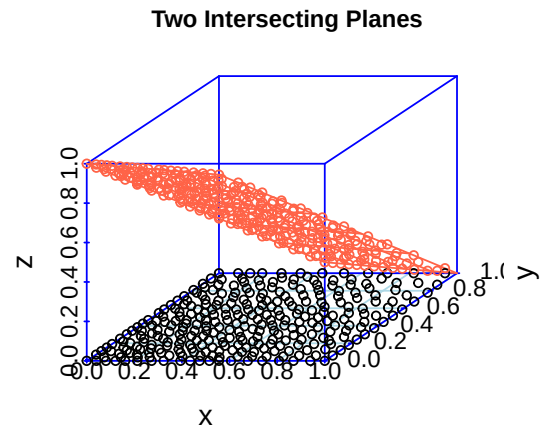

N=200, x2
Frequency
0
10
20
30
40
50
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 2]

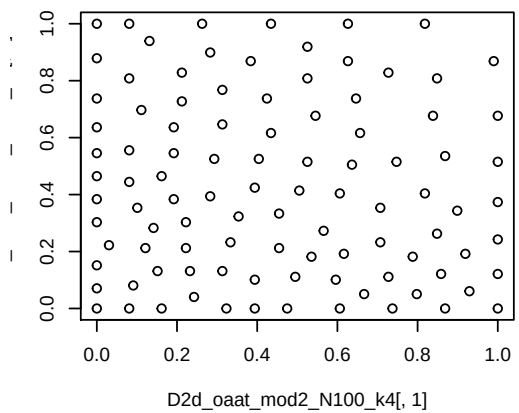

N=300, x2
Frequency
0
10
20
30
40
50
60
70
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 2]

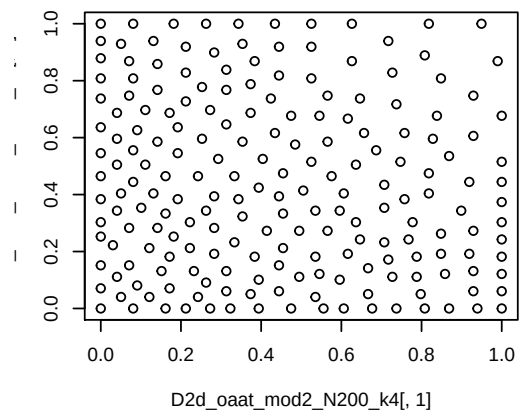
One-at-a-Time Algorithm, k = 4, N = 100, 200, 300

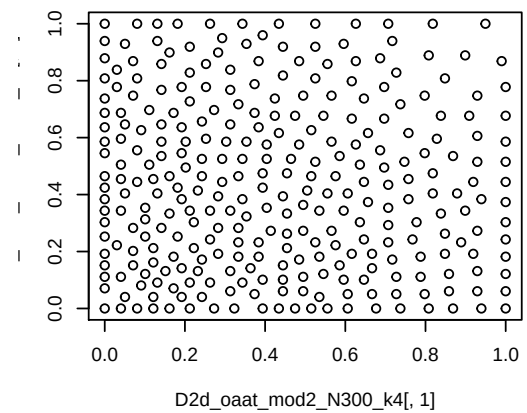


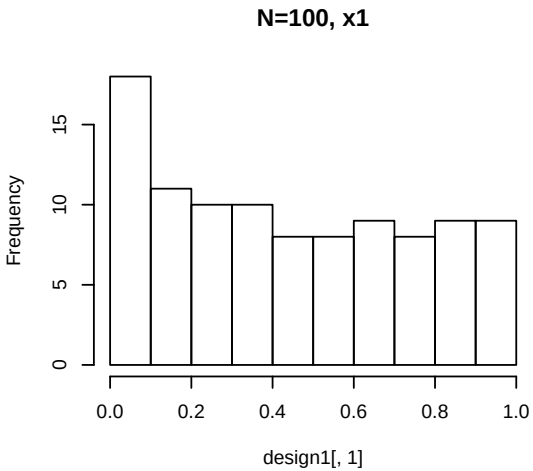


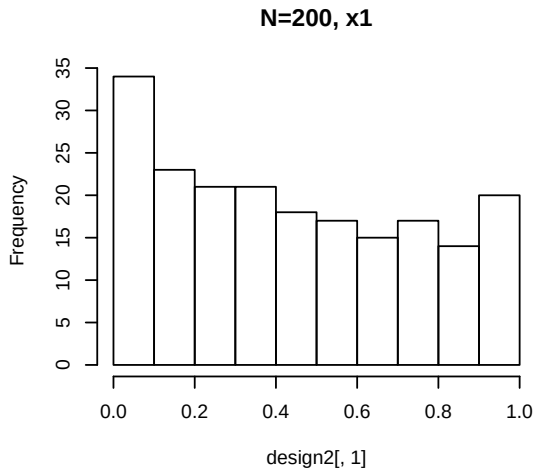


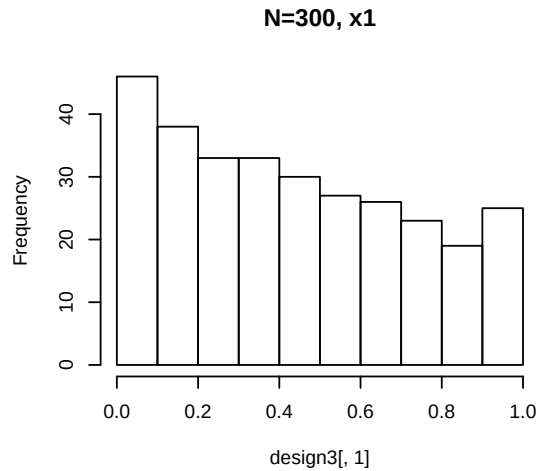


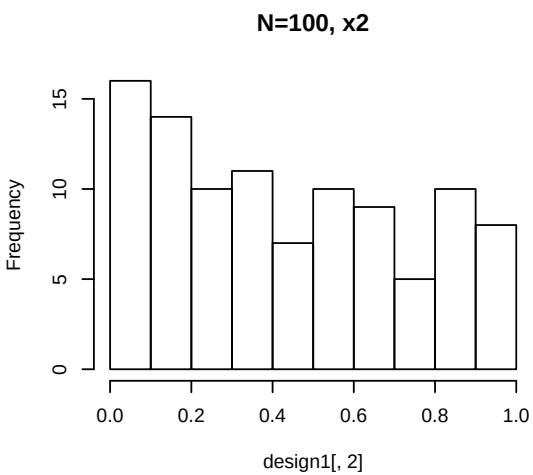


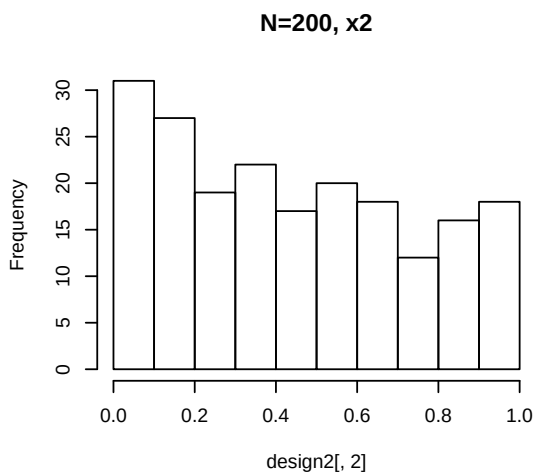



N=100, x1
Frequency
0
5
10
15
0.0
0.2
0.4
0.6
0.8
1.0
design1[, 1]


N=200, x1
Frequency
0
5
10
15
20
25
30
35
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 1]


N=300, x1
Frequency
0
10
20
30
40
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 1]


N=100, x2
Frequency
0
5
10
15
0.0
0.2
0.4
0.6
0.8
1.0
design1[, 2]


N=200, x2
Frequency
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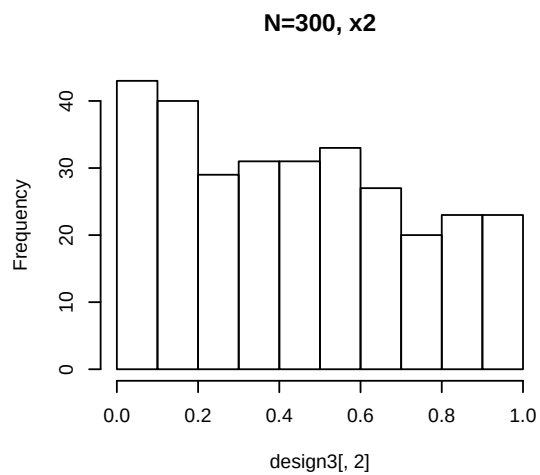
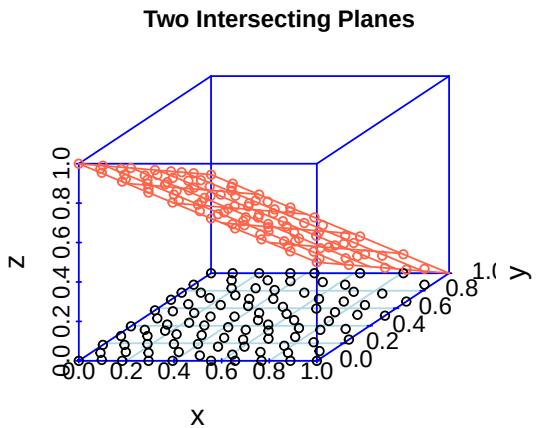
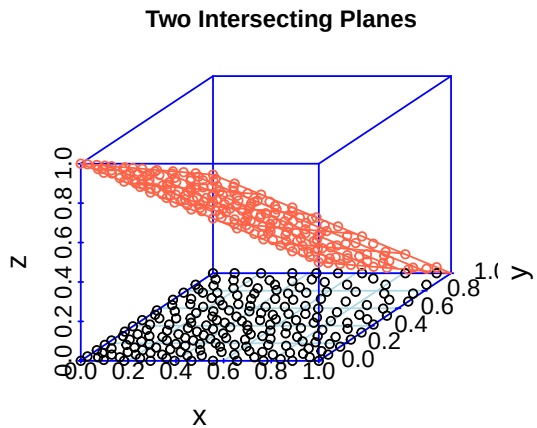
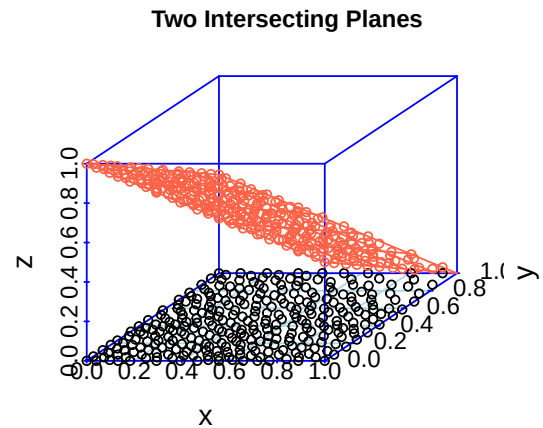
10
15
20
25
30
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 2]

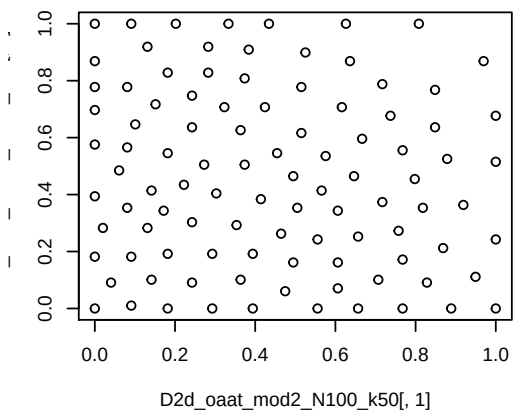

N=300, x2
Frequency
0
10
20
30
40
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 2]

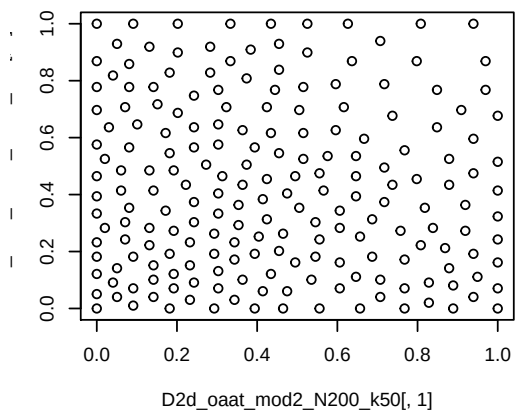
One-at-a-Time Algorithm, k = 50, N = 100, 200, 300

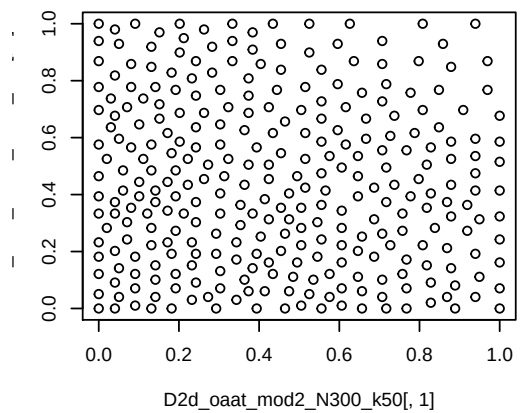


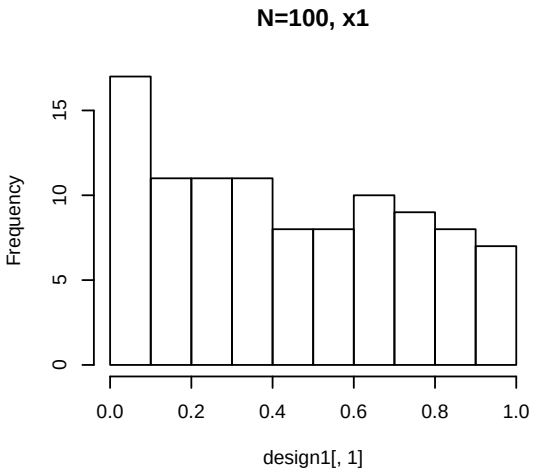


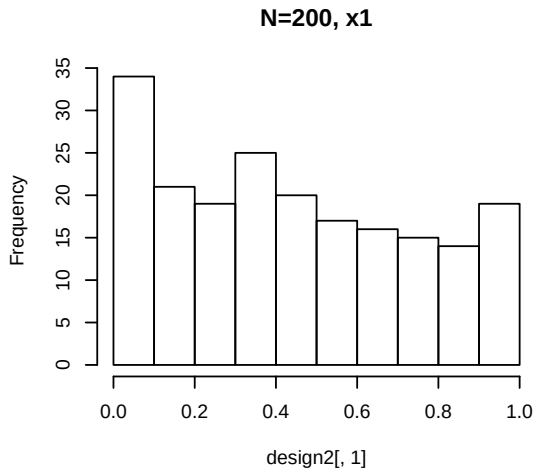


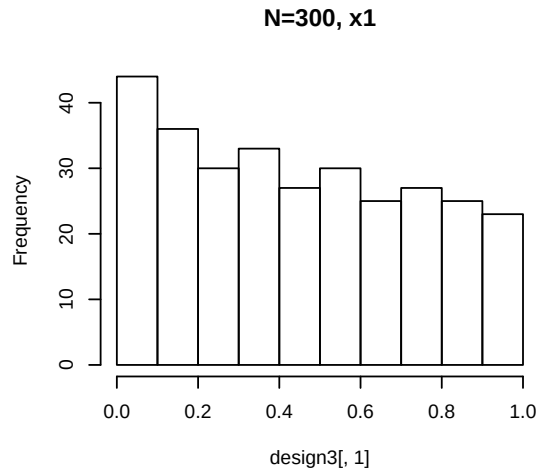







N=100, x1
Frequency
0
5
10
15
0.0
0.2
0.4
0.6
0.8
1.0
design1[, 1]


N=200, x1
Frequency
0
5
10
15
20
25
30
35
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 1]


N=300, x1
Frequency
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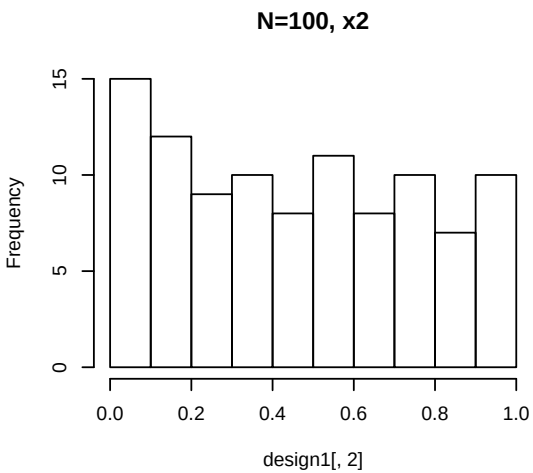
10
20
30
40
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 1]


N=100, x2
Frequency
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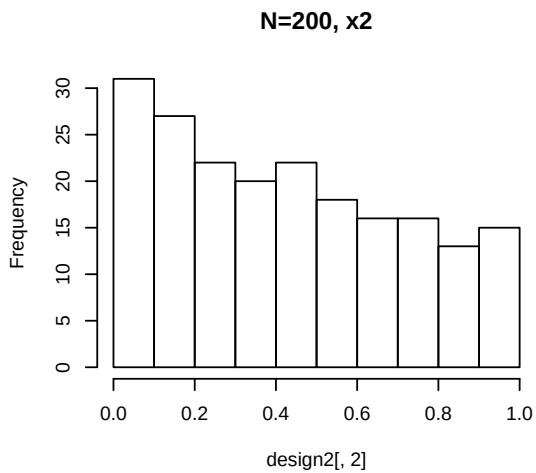
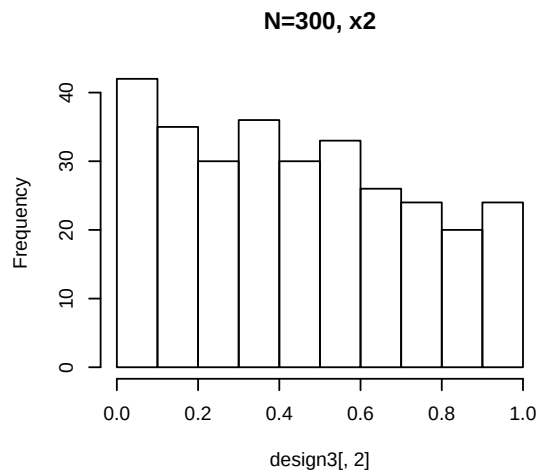
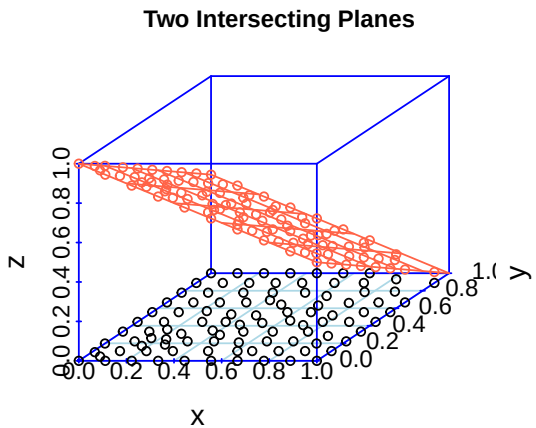
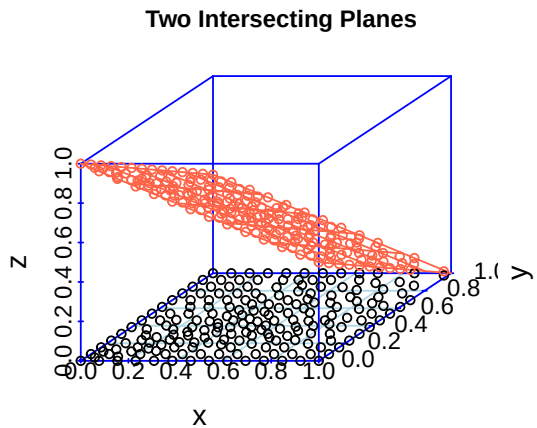
5
10
15
0.0
0.2
0.4
0.6
0.8
1.0
design1[, 2]

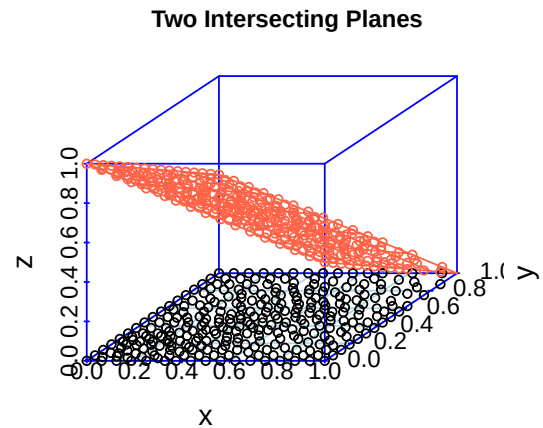

N=200, x2
Frequency
0
5
10
15
20
25
30
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 2]

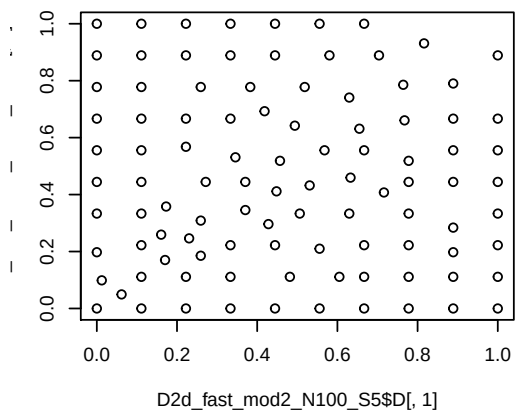

N=300, x2
Frequency
0
10
20
30
40
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 2]

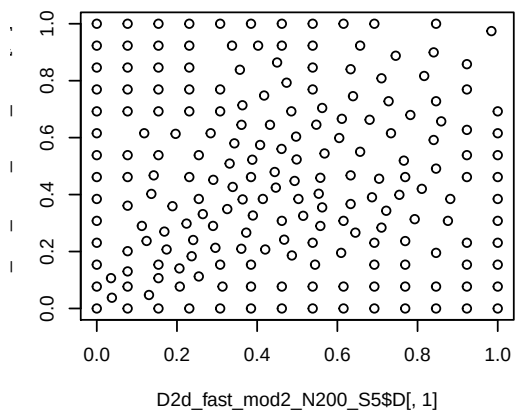
Fast Algorithm, S = 5, N = 100, 200, 300

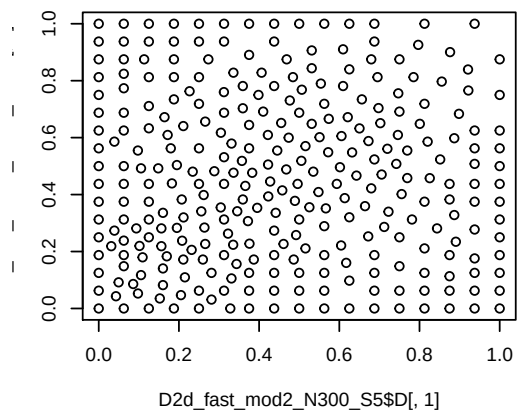


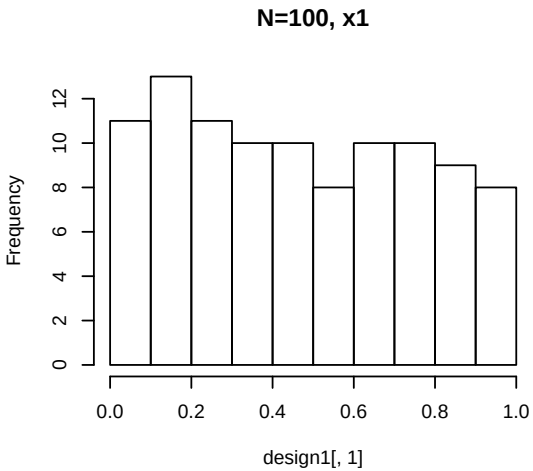


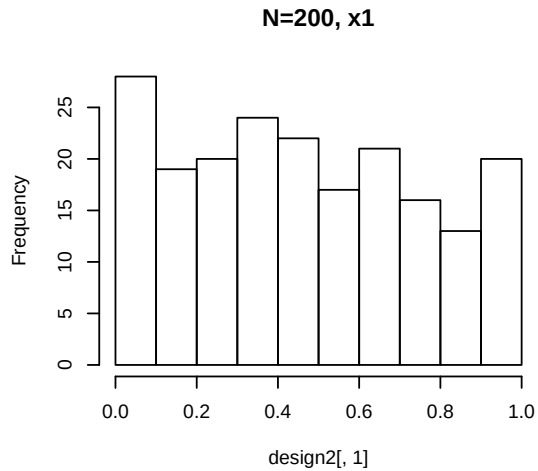


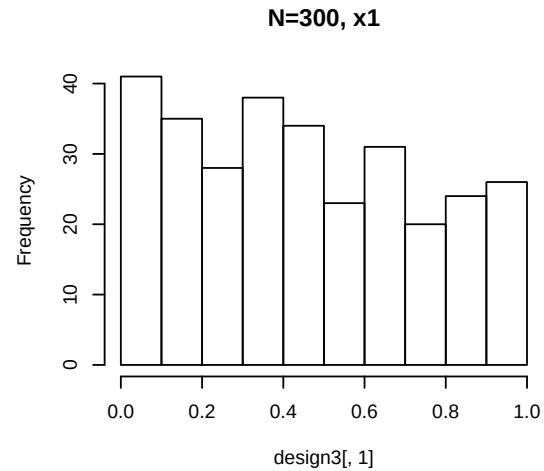


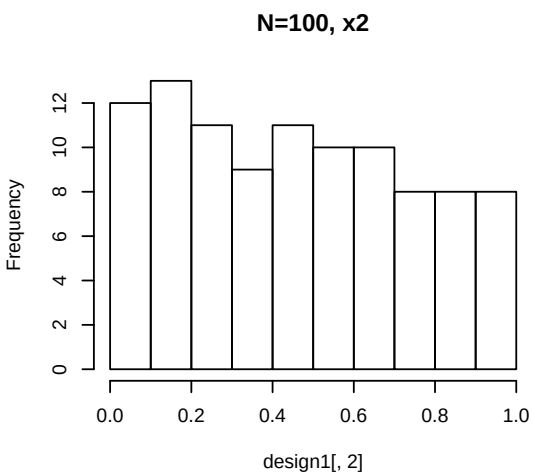


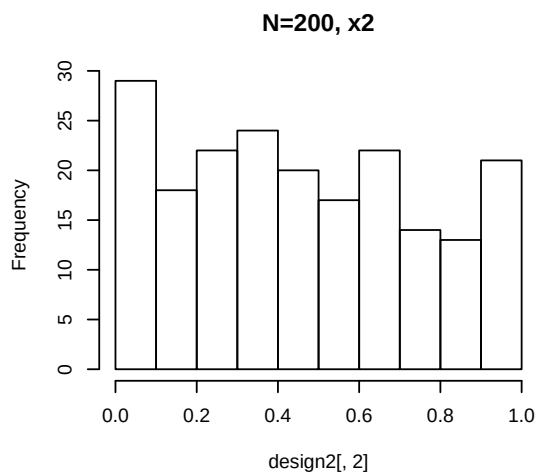


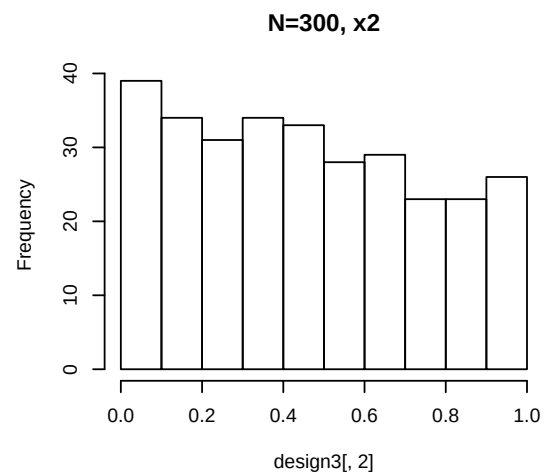

N=100, x1
Frequency
0
2
4
6
8
10
12
0.0
0.2
0.4
0.6
0.8
1.0
design1[, 1]


N=200, x1
Frequency
0
5
10
15
20
25
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 1]


N=300, x1
Frequency
0
10
20
30
40
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 1]


N=100, x2
Frequency
0
2
4
6
8
10
12
0.0
0.2
0.4
0.6
0.8
1.0
design1[, 2]


N=200, x2
Frequency
0
5
10
15
20
25
30
0.0
0.2
0.4
0.6
0.8
1.0
design2[, 2]


N=300, x2
Frequency
0
10
20
30
40
0.0
0.2
0.4
0.6
0.8
1.0
design3[, 2]

Example 2 Evaluations, N = 100

	1atT,k=1	1atT,k=4	1atT,k=50	Fast,S=5
TPEx10e-3	14.364	15.186	15.641	15.482
Fast Crit	25.163	16.395	15.294	18.934
1atT Crit (k=4)	56.53	48.13	48.564	49.645
Mean(D)[1]	0.43323	0.44192	0.43768	0.46676
Mean(D)[2]	0.43192	0.42758	0.46081	0.45705
sd(D)[1]	0.3474	0.31498	0.29888	0.31287
sd(D)[2]	0.34798	0.31074	0.30851	0.31022
V[B0|Y,X]	0.000723	0.000788	0.000847	0.000839
V[B1|Y,X]	0.0014	0.00159	0.00169	0.00159
V[B2|Y,X]	0.0014	0.00162	0.00162	0.00161

Example 2 Evaluations, N = 200

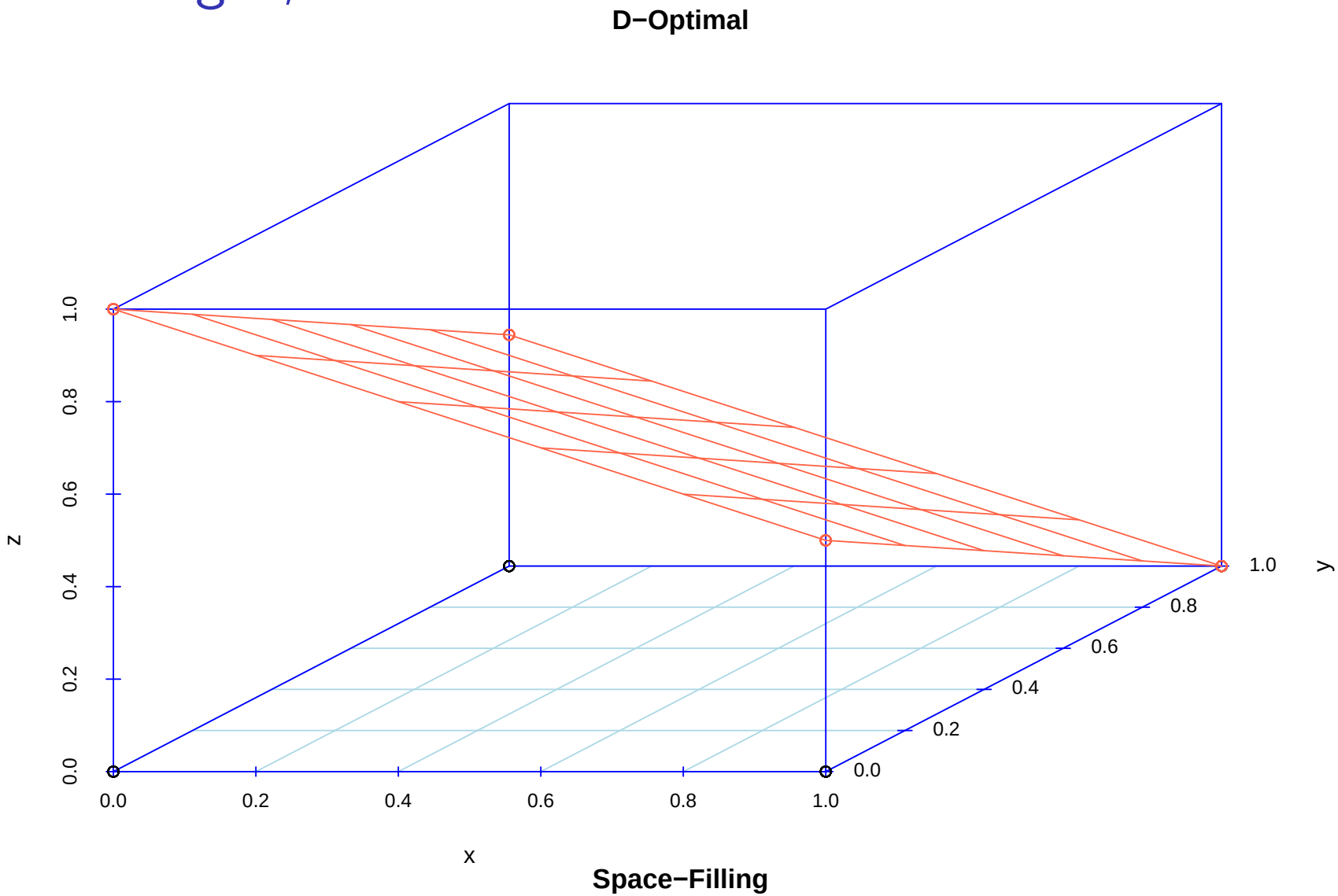
	1atT,k=1	1atT,k=4	1atT,k=50	Fast,S=5
TPEx10e-3	61.195	64.639	66.003	67.091
Fast Crit	62.579	24.731	21.455	25.355
1atT Crit (k=4)	122.19	84.472	84.789	86.892
Mean(D)[1]	0.43172	0.44126	0.43869	0.4617
Mean(D)[2]	0.4296	0.43753	0.42793	0.46123
sd(D)[1]	0.34535	0.30695	0.30139	0.29627
sd(D)[2]	0.34558	0.30524	0.29512	0.29959
V[B0|Y,X]	0.000441	0.000516	0.000504	0.00054
V[B1|Y,X]	0.000847	0.00101	0.00104	0.00106
V[B2|Y,X]	0.000847	0.00102	0.00108	0.00105

Example 2 Evaluations, N = 300

	1atT,k=1	1atT,k=4	1atT,k=50	Fast,S=5
TPEx10e-3	141.25	151.39	153.49	154.6
Fast Crit	99.084	30.068	27.986	29.649
1atT Crit (k=4)	159	116.17	117.71	118.84
Mean(D)[1]	0.43451	0.43215	0.44599	0.45216
Mean(D)[2]	0.43438	0.44003	0.44481	0.45756
sd(D)[1]	0.33928	0.2967	0.29505	0.29495
sd(D)[2]	0.33877	0.29586	0.29175	0.29268
V[B0|Y,X]	0.000323	0.000372	0.000394	0.000391
V[B1|Y,X]	0.000622	0.000776	0.000782	0.000781
V[B2|Y,X]	0.000623	0.000778	0.000796	0.00079

Compare Example 2 MEDs to Other Designs

Other Designs, N = 100



Space−Filling

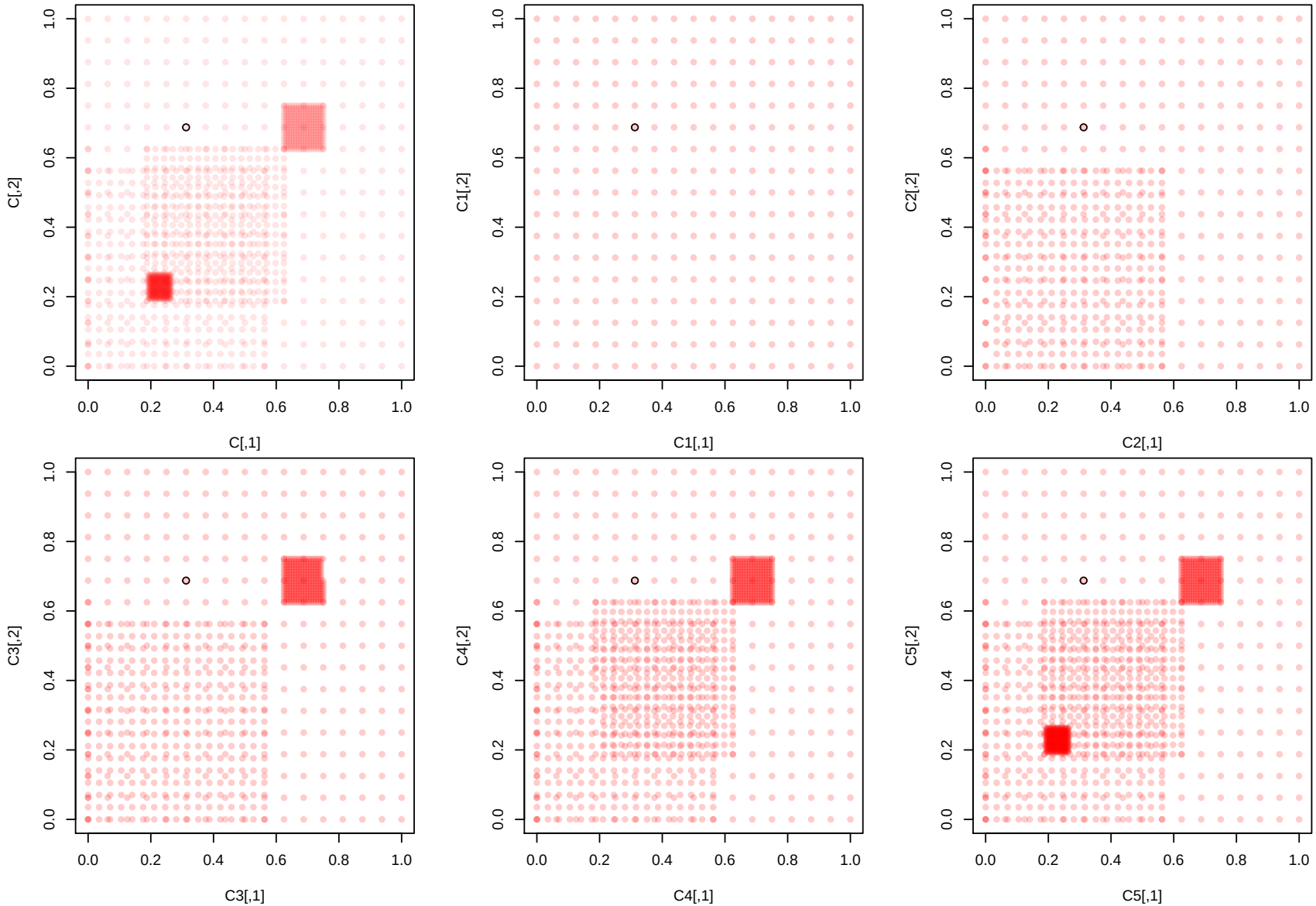
Example 2 Evaluations for Other Designs, N = 100

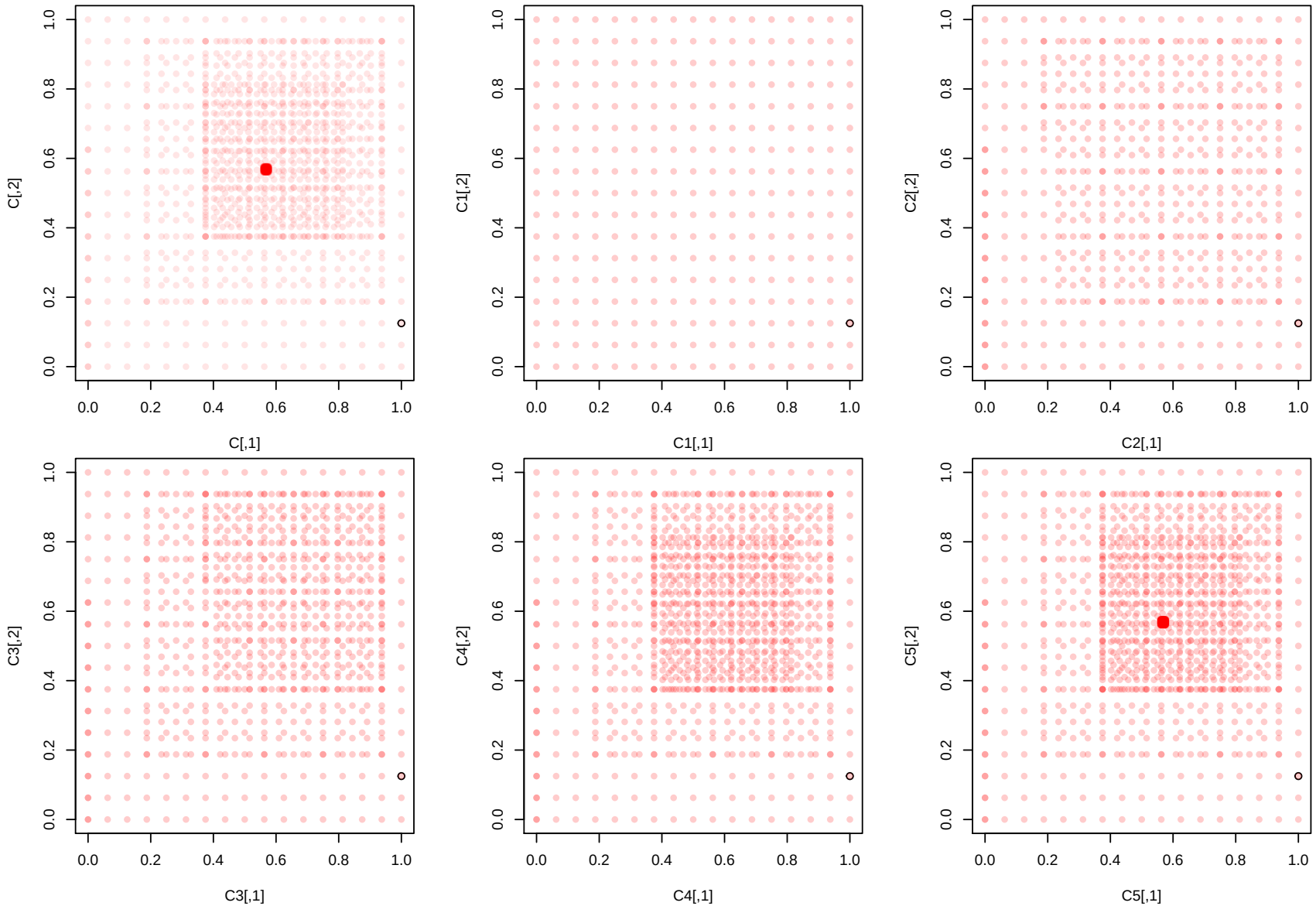
	1atT,k=1	1atT,k=4	1atT,k=50	Fast,S=5	D-Opt	Space	Random
TPEx10e-3	14.364	15.186	15.641	15.482	Inf	Inf	20.425
Fast Crit	25.163	16.395	15.294	18.934	Inf	Inf	122.86
1atT Crit (k=4)	56.53	48.13	48.564	49.645	Inf	Inf	165.77
Mean(D)[1]	0.43323	0.44192	0.43768	0.46676	0.5	0.5	0.51785
Mean(D)[2]	0.43192	0.42758	0.46081	0.45705	0.5	0.5	0.51747
sd(D)[1]	0.3474	0.31498	0.29888	0.31287	0.50252	0.32075	0.26758
sd(D)[2]	0.34798	0.31074	0.30851	0.31022	0.50252	0.32075	0.27182
V[B0|Y,X]	0.000723	0.000788	0.000847	0.000839	0.000588	0.000884	0.00106
V[B1|Y,X]	0.0014	0.00159	0.00169	0.00159	0.000803	0.00153	0.00189
V[B2|Y,X]	0.0014	0.00162	0.00162	0.00161	0.000803	0.00153	0.00186

See Behavior of Candidate Sets in Example 2
Fast MED, N = 300

Candidates for Design Point indexed at 10

```
## [1] 1456    2
```



Candidates for Design Point indexed at 51

```
## [1] 1456    2
```