TABLE 1 – Comparison Solver **LSQ** for The Pseudorandom Number Generator **PRNG**) with $m = 2^{t-1}$ and $n = 2^t$

Size-$m-n$	Iter	Cost	KKTresidual	Time	Niter–lsmr
2–4	5	4.0e-13	1.1e-07	0.22	86
8–16	5	6.8e-13	4.5e-08	0.78	293
16–32	5	4.3e-11	9.5e-07	1.30	461
32–64	5	2.3e-11	6.5e-07	1.75	601
64–128	5	2.0e-11	1.7e-07	2.74	800
128–256	5	2.6e-11	1.4e-07	4.65	929
256–512	4	5.5e-09	6.4e-07	5.03	676
512–1024	4	7.7e-10	2.6e-07	18.11	785
1024–2048	4	3.1e-09	3.2e-07	41.70	789
2048–4096	4	3.0e-07	9.1e-07	128.96	824
4096–8192	3	5.0e-07	2.2e-06	358.61	667

TABLE 2 – Comparison Solver **LSQ** for The Discrete Cosine Transform **DCT** Problem with $m = 2^{t-1}$ and $n = 2^t$

Size-$m - n$	Iter	Cost	KKTresidual	Time	Niter–lsmr
2–4	4	7.7e-15	1.5e-08	0.11	30
8–16	4	3.1e-14	1.5e-08	0.12	30
16–32	4	6.2e-14	1.5e-08	0.14	30
32–64	4	1.2e-13	1.5e-08	0.16	29
64–128	4	2.5e-13	1.5e-08	0.22	30
128–256	4	4.9e-13	1.5e-08	0.31	30
256–512	4	9.9e-13	1.5e-08	0.56	32
512–1024	4	2.0e-12	1.5e-08	0.89	31
1024–2048	4	3.9e-12	1.5e-08	1.68	33
2048–4096	4	7.9e-12	1.5e-08	3.69	33
4096–8192	4	1.6e-11	1.5e-08	6.75	33
8192–16384	4	3.2e-11	1.5e-08	12.85	34
16384–32768	4	6.3e-11	1.5e-08	25.86	33
32768–65536	4	1.3e-10	1.5e-08	57.65	35
65536–131072	4	2.5e-10	1.4e-08	109.37	34
131072–262144	4	5.0e-10	1.4e-08	237.20	35
262144–524288	4	1.0e-09	1.3e-08	495.53	36
524288–1048576	4	2.0e-09	1.2e-08	1098.79	36

TABLE 3 – Comparison Solver **l1–ls** for The Pseudorandom Number Generator **PRNG** with $m = 2^{t-1}$ and $n = 2^t$

Size-$m-n$	Iter	Cost	KKTresidual	Time	PCG–iter
2–4	35	6.89e-08	5.58e-14	0.12	73
8–16	42	7.03e-08	4.58e-14	0.35	334
16–32	43	7.05e-08	6.86e-14	0.52	582
32–64	47	7.06e-08	5.51e-14	0.70	787
64–128	54	7.07e-08	5.36e-14	0.92	880
128–256	94	7.07e-08	4.96e-14	2.44	1487
256–512	193	7.07e-08	6.91e-14	7.77	6401
512–1024	499	7.07e-08	7.01e-14	75.83	71185
1024–2048	2632	7.07e-23	4.73e-29	4628.07	1726014

TABLE 4 – Comparison Solver **l1–ls** for The Discrete Cosine Transform **DCT** Problem with $m = 2^{t-1}$ and $n = 2^t$

Size-$m-n$	Iter	Cost	KKTresidual	Time	PCG–iter

TABLE 5 – Comparison Solver **PDCO** for A Pseudorandom Number Generator **PRNG** Using **LSMR** with $m = 2^{t-1}$ and $n = 2^t$

Size-$m-n$	Iter	Cost	KKTresidual	Time	Niter–lsmr
2–4	16	7.77e-08	3.93e-09	0.31	155
8–16	16	7.78e-07	4.37e-09	0.53	261
16–32	17	1.57e-06	2.16e-09	0.78	320
32–64	17	3.31e-06	2.29e-09	1.03	346
64–128	17	7.20e-06	5.02e-09	0.95	357
128–256	18	1.37e-05	2.52e-09	2.31	473
256–512	19	2.87e-05	4.27e-09	3.37	506
512–1024	20	5.37e-05	1.41e-09	11.55	683
1024–2048	21	1.07e-04	1.23e-09	49.03	775

TABLE 6 – Comparison Solver **PDCO** for The Discrete Cosine Transform **DCT** Problem Using **LSMR** with $m = 2^{t-1}$ and $n = 2^t$

Size-$m - n$	Iter	Cost	KKTresidual	Time	Niter–lsmr
2–4	34	2.59e-07	1.08e-10	2.66	169
8–16	34	1.04e-06	1.08e-10	2.76	169
16–32	32	2.24e-06	2.72e-10	2.76	161
32–64	35	4.26e-06	2.66e-10	3.07	208
64–128	36	8.42e-06	6.72e-09	3.59	215
128–256	40	1.71e-05	6.87e-09	3.61	241
256–512	37	3.91e-05	1.78e-09	3.35	259
512–1024	40	7.20e-05	2.08e-09	6.34	319
1024–2048	44	1.32e-04	1.45e-09	12.98	358
8192–16384	46	1.16e-03	2.09e-12	74.91	456
16384–32768	49	2.17e-03	1.00e-12	161.27	484
32768–65536	49	4.50e-03	4.31e-12	351.02	490
65536–131072	51	9.15e-03	2.26e-11	901.78	546
131072–262144	55	1.70e-02	4.75e-11	2464.49	598