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

Size-$m-n$	Iter	Cost	KKTresidual	Time	Niter–lsmr
2–8	4	2.7e-06	6.9e-08	0.08	21
4–16	4	7.8e-06	1.9e-08	0.13	36
8–32	4	1.6e-05	1.3e-08	0.21	63
16–64	3	3.2e-05	5.4e-07	0.27	66
32–128	3	6.7e-05	1.7e-07	0.46	96
64–256	3	1.3e-04	5.5e-08	0.65	103
128–512	3	2.6e-04	1.7e-08	1.20	114
256–1024	3	5.2e-04	6.8e-09	2.85	118
512–2048	3	1.0e-03	2.0e-08	6.49	120
1024–4096	3	2.1e-03	1.1e-07	20.19	123
2048–8192	4	4.1e-03	1.5e-10	87.31	193
4096–16384	4	8.2e-03	4.2e-07	335.65	199

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

Size-$m-n$	Iter	Cost	KKTresidual	Time	Niter–lsmr
2–8	5	4.2e-07	2.2e-07	0.07	8
4–16	5	1.4e-06	6.5e-07	0.07	8
8–32	5	3.4e-06	6.8e-07	0.08	8
16–64	5	8.0e-06	6.7e-07	0.09	8
32–128	5	1.6e-05	6.8e-07	0.11	8
64–256	5	3.3e-05	7.0e-07	0.16	8
128–512	5	6.7e-05	7.1e-07	0.24	8
256–1024	5	1.3e-04	7.1e-07	0.42	8
512–2048	5	2.6e-04	7.1e-07	0.83	8
1024–4096	5	5.2e-04	7.1e-07	1.55	8
2048–8192	5	1.0e-03	7.1e-07	2.89	8
4096–16384	5	2.0e-03	7.2e-07	5.93	8
8192–32768	5	4.1e-03	7.1e-07	11.87	8
16384–65536	5	8.2e-03	7.1e-07	24.00	8
32768–131072	5	1.6e-02	7.1e-07	48.46	8
65536–262144	5	3.3e-02	7.1e-07	98.36	8
131072–524288	5	6.5e-02	7.0e-07	199.75	8
262144–1048576	5	1.3e-01	7.3e-07	395.43	8

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

Size-$m - n$	Iter	Cost	KKTresidual	Time	PCG–iter
2–8	24	6.38e-03	4.10e-09	0.33	48
4–16	27	1.20e-02	8.23e-09	0.27	103
8–32	31	1.50e-02	7.90e-09	0.22	240
16–64	35	1.64e-02	1.16e-08	0.53	486
32–128	32	2.64e-02	2.25e-08	0.88	1859
64–256	39	4.77e-02	3.69e-08	1.08	3092
128–512	85	8.98e-02	5.09e-08	2.45	5416
256–1024	220	1.63e-01	8.44e-08	15.38	16614
512–2048	626	3.27e-01	2.53e-07	153.21	82083
1024–4096	2024	7.07e-08	5.43e-14	4230.78	1542676
2048–8192	–	–	–	–	–
4096–16384	–	–	–	–	–

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

Size-$m-n$	Iter	Cost	KKTresidual	Time	PCG–iter
2–8	26	2.50e-03	1.70e-09	0.43	57
4–16	25	2.50e-03	2.45e-09	0.49	106
8–32	28	2.50e-03	1.85e-09	0.49	165
16–64	29	2.50e-03	2.14e-09	0.60	187
32–128	30	2.50e-03	1.66e-09	0.62	183
64–256	29	2.50e-03	2.34e-09	0.62	219
128–512	30	2.50e-03	2.39e-09	0.62	228
256–1024	30	2.50e-03	2.40e-09	0.69	225
512–2048	30	2.50e-03	1.61e-09	0.69	259
1024–4096	30	2.50e-03	2.47e-09	0.83	267
2048–8192	30	2.51e-03	1.46e-09	0.91	344
4096–16384	30	2.51e-03	2.20e-09	1.50	432
8192–32768	31	2.53e-03	1.46e-09	2.12	560
16384–65536	32	2.56e-03	2.20e-09	3.39	599
32768–131072	32	2.62e-03	1.95e-09	6.41	649
65536–262144	35	2.73e-03	1.95e-09	12.75	694
131072–524288	37	2.96e-03	1.95e-09	34.64	740
262144–1048576	38	3.43e-03	1.95e-09	87.72	861

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

Size-$m-n$	Iter	Cost	KKTresidual	Time	Niter–lsmr
2–8	139	2.37e-05	6.93e-09	4.04	1366
4–16	140	4.55e-05	6.13e-08	4.80	1765
8–32	141	9.43e-05	9.16e-09	2.58	2114
16–64	147	2.06e-04	2.89e-09	6.91	2471
32–128	155	3.83e-04	2.73e-09	9.64	2415
64–256	162	7.23e-04	2.66e-09	11.34	2252
128–512	168	1.48e-03	2.86e-09	17.04	2072
256–1024	174	2.75e-03	2.88e-09	39.42	1834
512–2048	180	4.74e-03	2.70e-09	120.42	1716
1024–4096	184	9.56e-03	2.88e-09	475.15	1635
2048–8192	–	–	–	–	–
4096–16384	–	–	–	–	–

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

Size-$m - n$	Iter	Cost	KKTresidual	Time	Niter–lsmr
2–8	144	1.29e-03	1.00e-06	4.14	282
4–16	144	1.32e-03	1.00e-06	3.48	281
8–32	144	1.39e-03	1.00e-06	3.86	281
16–64	144	1.52e-03	1.00e-06	4.18	281
32–128	144	1.77e-03	1.00e-06	4.37	281
64–256	144	2.29e-03	1.00e-06	4.43	281
128–512	144	3.35e-03	1.00e-06	5.29	281
256–1024	144	5.42e-03	1.00e-06	5.20	281
512–2048	144	9.51e-03	1.00e-06	5.52	281
1024–4096	144	1.77e-02	1.00e-06	6.29	281
2048–8192	144	3.40e-02	1.00e-06	7.10	281
4096–16384	144	6.66e-02	1.00e-06	11.51	281
8192–32768	146	1.25e-01	1.00e-06	21.04	285
16384–65536	147	2.61e-01	1.00e-06	46.84	287
32768–131072	148	5.11e-01	1.00e-06	91.84	288
65536–262144	149	9.91e-01	1.00e-06	179.74	291
131072–524288	150	1.98e+00	1.00e-06	344.74	293
262144–1048576	150	3.96e+00	1.00e-06	696.80	293