```python
In [4]:

In [5]:  #Confirms main.py prints s1/s5 lines
         MAIN = "/content/content/synth/main.py"   #change only if your path is differe

         with open(MAIN, "r", errors="ignore") as f:
             txt = f.read()
         assert "s1:" in txt and "s5:" in txt, "Please apply the s1/s5 patch to main.py
         print("Yes: main.py has s1/s5 in its progress print.")

         Yes: main.py has s1/s5 in its progress print.

In [6]:  #paths
         MAIN   = "/content/content/synth/main.py" #keep consistent
         LOGDIR = "/content/run_logs_full" #full-run logs here

         import os, pathlib, shlex, subprocess
         pathlib.Path(LOGDIR).mkdir(parents=True, exist_ok=True)

         def run_and_log(tag, **kw):
             """
             Runs main.py with given kwargs and writes stdout to LOGDIR/{tag}.log
             """
             cmd = ["python", MAIN]
             for k, v in kw.items():
                 cmd += [f"--{k}", str(v)]
             print("RUN:", " ".join(shlex.quote(c) for c in cmd))
             out = subprocess.run(cmd, text=True, capture_output=True)
             print(out.stdout)
             open(f"{LOGDIR}/{tag}.log", "w").write(out.stdout)
             if out.stderr.strip():
                 print("STDERR:\n", out.stderr)

In [7]:  #Learning rates LR-finder and tests
         LR_GD   = "1e-3"
         LR_ADAM = "1e-3"

         #Long iteration counts
         LONG_ITERS_GD   = 800_000
         LONG_ITERS_ADAM = 30_000

         #Shared synthetic configuration
         BASE_SYN = dict(
             method="DLNN",
             data="gaussian", #noiseless synthetic
             N=100, #problem size
             rank=5,
             reg_norm="ratio",
             initscale="1e-3",
             sample_size=4000,
             log_interval=2000 #fewer log lines -> smaller files
         )
```

```python
for depth in (2, 5):
    # GD (solid in plots)
    run_and_log(f"F1_gd_d{depth}_lam0",
        **BASE_SYN, depth=depth, lam="0.0", optim="GD",   lr=LR_GD,   niters=L

    # Adam (dashed in plots)
    run_and_log(f"F1_adam_d{depth}_lam0",
        **BASE_SYN, depth=depth, lam="0.0", optim="Adam", lr=LR_ADAM, niters=L
```

RUN: python /content/content/synth/main.py --method DLNN --data gaussian --N 10 0 --rank 5 --reg_norm ratio --initscale 1e-3 --sample_size 4000 --log_interval 2000 --depth 2 --lam 0.0 --optim GD --lr 1e-3 --niters 800000
depth: 2, iteration: 0, test_RMSE: 1.1268175840377808, erank: 66.9690017700195 3, s1: 0.002483401680365205, s5: 0.0021783490665256977
depth: 2, iteration: 2000, test_RMSE: 1.1268175840377808, erank: 66.97414398193 36, s1: 0.0024833730421960354, s5: 0.0021786484867334366
depth: 2, iteration: 4000, test_RMSE: 1.1268175840377808, erank: 66.97360229492 188, s1: 0.002484648721292615, s5: 0.0021800678223371506
depth: 2, iteration: 6000, test_RMSE: 1.1268175840377808, erank: 66.96730804443 36, s1: 0.0024872703943401575, s5: 0.0021835591178387403
depth: 2, iteration: 8000, test_RMSE: 1.1268175840377808, erank: 66.95498657226 562, s1: 0.0024911893997341394, s5: 0.0021900746505707502
depth: 2, iteration: 10000, test_RMSE: 1.1268175840377808, erank: 66.9366607666 0156, s1: 0.002496513770893216, s5: 0.0021985953208059072
depth: 2, iteration: 12000, test_RMSE: 1.1268175840377808, erank: 66.9120254516 6016, s1: 0.00250330101698637, s5: 0.002207739744335413
depth: 2, iteration: 14000, test_RMSE: 1.1268175840377808, erank: 66.8808898925 7812, s1: 0.002511589555069804, s5: 0.002216300694271922
depth: 2, iteration: 16000, test_RMSE: 1.1268175840377808, erank: 66.8431777954 1016, s1: 0.002521514892578125, s5: 0.002224573167040944
depth: 2, iteration: 18000, test_RMSE: 1.1268175840377808, erank: 66.7985305786 1328, s1: 0.0025331659708172083, s5: 0.0022330337669700384
depth: 2, iteration: 20000, test_RMSE: 1.1268175840377808, erank: 66.7467651367 1875, s1: 0.002546718344092369, s5: 0.00224180496297767
depth: 2, iteration: 22000, test_RMSE: 1.1268175840377808, erank: 66.6876907348 6328, s1: 0.002562381327152252, s5: 0.0022509219124913216
depth: 2, iteration: 24000, test_RMSE: 1.1268175840377808, erank: 66.6210098266 6016, s1: 0.0025804811157286167, s5: 0.002260324778035283
depth: 2, iteration: 26000, test_RMSE: 1.1268175840377808, erank: 66.5465164184 5703, s1: 0.0026014847680926323, s5: 0.0022700026165694
depth: 2, iteration: 28000, test_RMSE: 1.1268175840377808, erank: 66.4640045166 0156, s1: 0.002626105211675167, s5: 0.0022799912840127945
depth: 2, iteration: 30000, test_RMSE: 1.1268174648284912, erank: 66.3732376098 6328, s1: 0.002655301010236144, s5: 0.002290369477123022
depth: 2, iteration: 32000, test_RMSE: 1.1268174648284912, erank: 66.2738647460 9375, s1: 0.002690454013645649, s5: 0.002301227068528533
depth: 2, iteration: 34000, test_RMSE: 1.1268174648284912, erank: 66.1657485961 914, s1: 0.002732722321525216, s5: 0.0023126970045268536
depth: 2, iteration: 36000, test_RMSE: 1.1268174648284912, erank: 66.0484848022 461, s1: 0.0027824800927191973, s5: 0.0023249881342053413
depth: 2, iteration: 38000, test_RMSE: 1.1268174648284912, erank: 65.9219360351 5625, s1: 0.0028392616659402847, s5: 0.002338516293093562
depth: 2, iteration: 40000, test_RMSE: 1.1268173456192017, erank: 65.7857513427 7344, s1: 0.002902455162256956, s5: 0.002353484509512782
depth: 2, iteration: 42000, test_RMSE: 1.1268173456192017, erank: 65.6395492553 711, s1: 0.002971600042656064, s5: 0.0023695286363363266
depth: 2, iteration: 44000, test_RMSE: 1.1268173456192017, erank: 65.4832992553 711, s1: 0.0030463754665106535, s5: 0.002385411411523819
depth: 2, iteration: 46000, test_RMSE: 1.1268173456192017, erank: 65.3167037963 8672, s1: 0.0031267658341675997, s5: 0.002400455065071583
depth: 2, iteration: 48000, test_RMSE: 1.126817226409912, erank: 65.13941955566 406, s1: 0.003212721087038517, s5: 0.0024148665834218264
depth: 2, iteration: 50000, test_RMSE: 1.126817226409912, erank: 64.95127105712

89, s1: 0.003304427256807685, s5: 0.002429282059893012
depth: 2, iteration: 52000, test_RMSE: 1.126817226409912, erank: 64.75187683105
469, s1: 0.0034018773585557938, s5: 0.0024442151188850403
depth: 2, iteration: 54000, test_RMSE: 1.1268171072006226, erank: 64.5411605834
961, s1: 0.0035052478779107332, s5: 0.0024599931202828884
depth: 2, iteration: 56000, test_RMSE: 1.126816987991333, erank: 64.3188476562
5, s1: 0.003614695742726326, s5: 0.002476794645190239
depth: 2, iteration: 58000, test_RMSE: 1.126816987991333, erank: 64.08464813232
422, s1: 0.0037304232828319073, s5: 0.002494827611371875
depth: 2, iteration: 60000, test_RMSE: 1.1268168687820435, erank: 63.8383369445
8008, s1: 0.003852591384202242, s5: 0.002514178166165948
depth: 2, iteration: 62000, test_RMSE: 1.1268168687820435, erank: 63.5797576904
2969, s1: 0.003981400281190872, s5: 0.002534953411668539
depth: 2, iteration: 64000, test_RMSE: 1.126816749572754, erank: 63.30899429321
289, s1: 0.004117083270102739, s5: 0.002557359402999282
depth: 2, iteration: 66000, test_RMSE: 1.1268166303634644, erank: 63.0255012512
207, s1: 0.004259930923581123, s5: 0.002581470413133502
depth: 2, iteration: 68000, test_RMSE: 1.1268165111541748, erank: 62.7290344238
28125, s1: 0.004410162102431059, s5: 0.0026075365021824837
depth: 2, iteration: 70000, test_RMSE: 1.1268163919448853, erank: 62.4192924499
5117, s1: 0.004568094853311777, s5: 0.002635799814015627
depth: 2, iteration: 72000, test_RMSE: 1.1268162727355957, erank: 62.0963287353
5156, s1: 0.004733992274850607, s5: 0.0026665301993489265
depth: 2, iteration: 74000, test_RMSE: 1.1268162727355957, erank: 61.7598724365
2344, s1: 0.004908200819045305, s5: 0.0026999348774552345
depth: 2, iteration: 76000, test_RMSE: 1.1268160343170166, erank: 61.4097709655
7617, s1: 0.005091039929538965, s5: 0.0027363209519535303
depth: 2, iteration: 78000, test_RMSE: 1.126815915107727, erank: 61.04587936401
367, s1: 0.005282912869006395, s5: 0.002775769215077162
depth: 2, iteration: 80000, test_RMSE: 1.1268157958984375, erank: 60.6681404113
7695, s1: 0.005484155844897032, s5: 0.002818463137373328
depth: 2, iteration: 82000, test_RMSE: 1.126815676689148, erank: 60.27629470825
195, s1: 0.005695205181837082, s5: 0.002864376176148653
depth: 2, iteration: 84000, test_RMSE: 1.1268154382705688, erank: 59.8705673217
77344, s1: 0.00591647531837225, s5: 0.0029134887736290693
depth: 2, iteration: 86000, test_RMSE: 1.1268153190612793, erank: 59.4506683349
6094, s1: 0.006148449145257473, s5: 0.0029658402781933546
depth: 2, iteration: 88000, test_RMSE: 1.1268150806427002, erank: 59.0164947509
7656, s1: 0.006391571834683418, s5: 0.003021284006536007
depth: 2, iteration: 90000, test_RMSE: 1.1268149614334106, erank: 58.5681152343
75, s1: 0.006646414287388325, s5: 0.0030797885265201335
depth: 2, iteration: 92000, test_RMSE: 1.1268147230148315, erank: 58.1055755615
2344, s1: 0.006913453806191683, s5: 0.0031413312535732985
depth: 2, iteration: 94000, test_RMSE: 1.1268144845962524, erank: 57.6288986206
0547, s1: 0.00719320448115468, s5: 0.0032058674842119217
depth: 2, iteration: 96000, test_RMSE: 1.1268142461776733, erank: 57.1381835937
5, s1: 0.007486290298402309, s5: 0.003273325739428401
depth: 2, iteration: 98000, test_RMSE: 1.1268140077590942, erank: 56.6333312988
28125, s1: 0.007793441414833069, s5: 0.003343788906931877
depth: 2, iteration: 100000, test_RMSE: 1.1268136501312256, erank: 56.114585876
464844, s1: 0.00811514537781477, s5: 0.003417138010263443
depth: 2, iteration: 102000, test_RMSE: 1.1268134117126465, erank: 55.582057952
88086, s1: 0.008452177047729492, s5: 0.003493361407890916
depth: 2, iteration: 104000, test_RMSE: 1.1268131732940674, erank: 55.035869598

38867, s1: 0.008805247023701668, s5: 0.003572475863620639
depth: 2, iteration: 106000, test_RMSE: 1.1268128156661987, erank: 54.476287841
796875, s1: 0.009175129234790802, s5: 0.003654350293800235
depth: 2, iteration: 108000, test_RMSE: 1.12681245803833, erank: 53.90345382690
43, s1: 0.009562557563185692, s5: 0.003738728817552328
depth: 2, iteration: 110000, test_RMSE: 1.1268121004104614, erank: 53.317836761
47461, s1: 0.009968362748622894, s5: 0.0038252195809036493
depth: 2, iteration: 112000, test_RMSE: 1.1268117427825928, erank: 52.719398498
535156, s1: 0.010393479838967323, s5: 0.003913565538823605
depth: 2, iteration: 114000, test_RMSE: 1.1268112659454346, erank: 52.108871459
96094, s1: 0.010838759131729603, s5: 0.004003607202321291
depth: 2, iteration: 116000, test_RMSE: 1.126810908317566, erank: 51.4863433837
8906, s1: 0.011305205523967743, s5: 0.004095918498933315
depth: 2, iteration: 118000, test_RMSE: 1.1268104314804077, erank: 50.852317810
058594, s1: 0.011793749406933784, s5: 0.004191141109913588
depth: 2, iteration: 120000, test_RMSE: 1.126810073852539, erank: 50.2072334289
5508, s1: 0.01230555772781372, s5: 0.004289804492145777
depth: 2, iteration: 122000, test_RMSE: 1.1268094778060913, erank: 49.551273345
947266, s1: 0.012841712683439255, s5: 0.0043924059718847275
depth: 2, iteration: 124000, test_RMSE: 1.126809000968933, erank: 48.8852539062
5, s1: 0.01340328250080347, s5: 0.0044992719776928425
depth: 2, iteration: 126000, test_RMSE: 1.1268084049224854, erank: 48.209747314
453125, s1: 0.013991564512252808, s5: 0.004610524978488684
depth: 2, iteration: 128000, test_RMSE: 1.1268079280853271, erank: 47.525146484
375, s1: 0.014607813209295273, s5: 0.004726290702819824
depth: 2, iteration: 130000, test_RMSE: 1.1268073320388794, erank: 46.832019805
9082, s1: 0.01525340136140585, s5: 0.004846774507313967
depth: 2, iteration: 132000, test_RMSE: 1.126806616783142, erank: 46.1310310363
7695, s1: 0.01592974178493023, s5: 0.004971998743712902
depth: 2, iteration: 134000, test_RMSE: 1.1268060207366943, erank: 45.422870635
98633, s1: 0.01663823612034321, s5: 0.0051021575927734375
depth: 2, iteration: 136000, test_RMSE: 1.126805305480957, erank: 44.7078742980
957, s1: 0.017380397766828537, s5: 0.0052372002974152565
depth: 2, iteration: 138000, test_RMSE: 1.1268045902252197, erank: 43.987163543
70117, s1: 0.018157852813601494, s5: 0.00537727028131485
depth: 2, iteration: 140000, test_RMSE: 1.1268037557601929, erank: 43.261184692
38281, s1: 0.018972385674715042, s5: 0.005522469524294138
depth: 2, iteration: 142000, test_RMSE: 1.126802921295166, erank: 42.5306930541
9922, s1: 0.019825682044029236, s5: 0.005672930274158716
depth: 2, iteration: 144000, test_RMSE: 1.1268022060394287, erank: 41.796463012
69531, s1: 0.02071963995695114, s5: 0.005828638095408678
depth: 2, iteration: 146000, test_RMSE: 1.1268012523651123, erank: 41.059150695
80078, s1: 0.021656246855854988, s5: 0.005989825818687677
depth: 2, iteration: 148000, test_RMSE: 1.126800298690796, erank: 40.3194732666
0156, s1: 0.02263754978775978, s5: 0.006156534422188997
depth: 2, iteration: 150000, test_RMSE: 1.1267993450164795, erank: 39.578311920
166016, s1: 0.023665448650717735, s5: 0.006328980438411236
depth: 2, iteration: 152000, test_RMSE: 1.1267982721328735, erank: 38.836364746
09375, s1: 0.024742664769291878, s5: 0.006507200188934803
depth: 2, iteration: 154000, test_RMSE: 1.1267971992492676, erank: 38.094249725
3418, s1: 0.025871073827147484, s5: 0.00669139763340354
depth: 2, iteration: 156000, test_RMSE: 1.126796007156372, erank: 37.3529396057
1289, s1: 0.02705339714884758, s5: 0.006881778594106436
depth: 2, iteration: 158000, test_RMSE: 1.1267948150634766, erank: 36.612972259

521484, s1: 0.028292246162891388, s5: 0.007078399416059256
depth: 2, iteration: 160000, test_RMSE: 1.126793622970581, erank: 35.8751792907
71484, s1: 0.029590236023068428, s5: 0.007281579542905092
depth: 2, iteration: 162000, test_RMSE: 1.126792311668396, erank: 35.1404647827
14844, s1: 0.030949678272008896, s5: 0.007491336669772863
depth: 2, iteration: 164000, test_RMSE: 1.126791000366211, erank: 34.4090423583
9844, s1: 0.03237448260188103, s5: 0.0077081178314983845
depth: 2, iteration: 166000, test_RMSE: 1.1267894506454468, erank: 33.681964874
26758, s1: 0.03386765345931053, s5: 0.007931999862194061
depth: 2, iteration: 168000, test_RMSE: 1.1267880201339722, erank: 32.959815979
003906, s1: 0.03543202579021454, s5: 0.00816313922405243
depth: 2, iteration: 170000, test_RMSE: 1.1267863512039185, erank: 32.243259429
93164, s1: 0.03707119822502136, s5: 0.008401836268603802
depth: 2, iteration: 172000, test_RMSE: 1.1267848014831543, erank: 31.533073425
29297, s1: 0.03878830373287201, s5: 0.008648455142974854
depth: 2, iteration: 174000, test_RMSE: 1.126783013343811, erank: 30.8296108245
8496, s1: 0.040587857365608215, s5: 0.008903012610971928
depth: 2, iteration: 176000, test_RMSE: 1.1267812252044678, erank: 30.133592605
59082, s1: 0.04247321933507919, s5: 0.009165904484689236
depth: 2, iteration: 178000, test_RMSE: 1.126779317855835, erank: 29.4455013275
1465, s1: 0.04444891586899757 4, s5: 0.009437531232833862
depth: 2, iteration: 180000, test_RMSE: 1.1267772912979126, erank: 28.765838623
046875, s1: 0.046518921852111816, s5: 0.009717931039631367
depth: 2, iteration: 182000, test_RMSE: 1.1267751455307007, erank: 28.095050811
767578, s1: 0.04868829622864723, s5: 0.010007415898144245
depth: 2, iteration: 184000, test_RMSE: 1.1267729997634888, erank: 27.433828353
881836, s1: 0.050961028784513474, s5: 0.010306315496563911
depth: 2, iteration: 186000, test_RMSE: 1.1267706155776978, erank: 26.782293319
70215, s1: 0.05334286391735077, s5: 0.010615107603371143
depth: 2, iteration: 188000, test_RMSE: 1.1267682313919067, erank: 26.140924453
73535, s1: 0.05583840236067772, s5: 0.010933943092823029
depth: 2, iteration: 190000, test_RMSE: 1.1267657279968262, erank: 25.510185241
69922, s1: 0.0584535151720047, s5: 0.011263171210885048
depth: 2, iteration: 192000, test_RMSE: 1.126763105392456, erank: 24.8901176452
63672, s1: 0.06119418889284134, s5: 0.011603149585425854
depth: 2, iteration: 194000, test_RMSE: 1.1267603635787964, erank: 24.281435012
817383, s1: 0.06406527757644653, s5: 0.011954127810895443
depth: 2, iteration: 196000, test_RMSE: 1.1267575025558472, erank: 23.684045791
625977, s1: 0.06707409024238586, s5: 0.012316657230257988
depth: 2, iteration: 198000, test_RMSE: 1.1267545223236084, erank: 23.098289489
746094, s1: 0.07022697478532791, s5: 0.01269101444631815
depth: 2, iteration: 200000, test_RMSE: 1.1267513036727905, erank: 22.524267196
655273, s1: 0.07353086769580841, s5: 0.013077585026621819
depth: 2, iteration: 202000, test_RMSE: 1.126747965812683, erank: 21.9622936248
7793, s1: 0.07699260860681534, s5: 0.01347685419023037
depth: 2, iteration: 204000, test_RMSE: 1.1267445087432861, erank: 21.412357330
322266, s1: 0.08062008023262024, s5: 0.013889024965465069
depth: 2, iteration: 206000, test_RMSE: 1.1267409324645996, erank: 20.874551773
07129, s1: 0.08442170917987823, s5: 0.014314603991806507
depth: 2, iteration: 208000, test_RMSE: 1.126737117767334, erank: 20.3490943908
6914, s1: 0.08840429037809372, s5: 0.014754201285541058
depth: 2, iteration: 210000, test_RMSE: 1.1267331838607788, erank: 19.835798263
549805, s1: 0.09257835894823074, s5: 0.015208248980343342
depth: 2, iteration: 212000, test_RMSE: 1.1267290115356445, erank: 19.334901809

692383, s1: 0.0969519391655922, s5: 0.015676777809858322
depth: 2, iteration: 214000, test_RMSE: 1.1267247200012207, erank: 18.846252441
40625, s1: 0.10153427720069885, s5: 0.016160815954208374
depth: 2, iteration: 216000, test_RMSE: 1.1267201900482178, erank: 18.369728088
378906, s1: 0.10633710771799088, s5: 0.016660630702972412
depth: 2, iteration: 218000, test_RMSE: 1.1267154216766357, erank: 17.905488967
895508, s1: 0.11136890202760696, s5: 0.017176862806081772
depth: 2, iteration: 220000, test_RMSE: 1.1267105340957642, erank: 17.453313827
51465, s1: 0.11664194613695145, s5: 0.017709797248244286
depth: 2, iteration: 222000, test_RMSE: 1.126705288887024, erank: 17.0131416320
80078, s1: 0.12216698378324509, s5: 0.018260229378938675
depth: 2, iteration: 224000, test_RMSE: 1.1266998052597046, erank: 16.584829330
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depth: 2, iteration: 226000, test_RMSE: 1.1266942024230957, erank: 16.168321609
49707, s1: 0.1340230107307434, s5: 0.01941538043320179
depth: 2, iteration: 228000, test_RMSE: 1.1266882419586182, erank: 15.763394355
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depth: 2, iteration: 230000, test_RMSE: 1.126682162284851, erank: 15.3699417114
25781, s1: 0.14703921973705292, s5: 0.020647287368774414
depth: 2, iteration: 232000, test_RMSE: 1.1266756057739258, erank: 14.987746238
708496, s1: 0.15401816368103027, s5: 0.021293560042977333
depth: 2, iteration: 234000, test_RMSE: 1.126668930053711, erank: 14.6165714263
91602, s1: 0.16133077442646027, s5: 0.02196088805794716
depth: 2, iteration: 236000, test_RMSE: 1.126661777496338, erank: 14.2562828063
96484, s1: 0.16899244487285614, s5: 0.022649914026260376
depth: 2, iteration: 238000, test_RMSE: 1.1266543865203857, erank: 13.906742095
947266, s1: 0.17701996862888336, s5: 0.023361505940556526
depth: 2, iteration: 240000, test_RMSE: 1.126646637916565, erank: 13.5676269531
25, s1: 0.185431107878685, s5: 0.024096259847283363
depth: 2, iteration: 242000, test_RMSE: 1.126638650894165, erank: 13.2388181686
40137, s1: 0.19424332678318024, s5: 0.02485533244907856
depth: 2, iteration: 244000, test_RMSE: 1.126630187034607, erank: 12.9199647903
44238, s1: 0.20347756147384644, s5: 0.025638746097683907
depth: 2, iteration: 246000, test_RMSE: 1.1266213655471802, erank: 12.610950469
970703, s1: 0.21315106749534607, s5: 0.026447780430316925
depth: 2, iteration: 248000, test_RMSE: 1.1266121864318848, erank: 12.311510086
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depth: 2, iteration: 250000, test_RMSE: 1.1266025304794312, erank: 12.021406173
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depth: 2, iteration: 252000, test_RMSE: 1.1265925168991089, erank: 11.740419387
817383, s1: 0.24502919614315033, s5: 0.02903696522116661
depth: 2, iteration: 254000, test_RMSE: 1.126582145690918, erank: 11.4682941436
76758, s1: 0.2566845417022705, s5: 0.029957063496112823
depth: 2, iteration: 256000, test_RMSE: 1.1265710592269897, erank: 11.204827308
654785, s1: 0.2688937783241272, s5: 0.030907070264220238
depth: 2, iteration: 258000, test_RMSE: 1.1265596151351929, erank: 10.949774742
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depth: 2, iteration: 260000, test_RMSE: 1.1265478134155273, erank: 10.702877998
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depth: 2, iteration: 262000, test_RMSE: 1.1265352964401245, erank: 10.463941574
09668, s1: 0.3091195225715637, s5: 0.0339469388127327
depth: 2, iteration: 264000, test_RMSE: 1.1265223026275635, erank: 10.232705116
271973, s1: 0.32382267713546753, s5: 0.03502728044986725
depth: 2, iteration: 266000, test_RMSE: 1.1265087127685547, erank: 10.008959770

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depth: 2, iteration: 268000, test_RMSE: 1.1264945268630981, erank: 9.7924938201
9043, s1: 0.3553570806980133, s5: 0.03729412704706192
depth: 2, iteration: 270000, test_RMSE: 1.1264797449111938, erank: 9.5830774307
25098, s1: 0.37225407361984253, s5: 0.03848356381058693
depth: 2, iteration: 272000, test_RMSE: 1.1264642477035522, erank: 9.3804960250
8545, s1: 0.3899522125720978, s5: 0.03971162810921669
depth: 2, iteration: 274000, test_RMSE: 1.1264482736587524, erank: 9.1845493316
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depth: 2, iteration: 276000, test_RMSE: 1.1264313459396362, erank: 8.9949598312
37793, s1: 0.42789992690086365, s5: 0.04228837043046951
depth: 2, iteration: 278000, test_RMSE: 1.1264138221740723, erank: 8.8116264343
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depth: 2, iteration: 280000, test_RMSE: 1.126395583152771, erank: 8.63428974151
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depth: 2, iteration: 282000, test_RMSE: 1.1263765096664429, erank: 8.4627666473
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depth: 2, iteration: 284000, test_RMSE: 1.1263567209243774, erank: 8.2968606948
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depth: 2, iteration: 286000, test_RMSE: 1.1263359785079956, erank: 8.1364135742
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depth: 2, iteration: 288000, test_RMSE: 1.126314401626587, erank: 7.98120069503
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depth: 2, iteration: 290000, test_RMSE: 1.1262918710708618, erank: 7.8310894966
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94336, s1: 0.6200568079948425, s5: 0.054419323801994324
depth: 2, iteration: 294000, test_RMSE: 1.126244068145752, erank: 7.54545497894
2871, s1: 0.6494274735450745, s5: 0.056165795773267746
depth: 2, iteration: 296000, test_RMSE: 1.126218557357788, erank: 7.40962266921
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depth: 2, iteration: 298000, test_RMSE: 1.1261920928955078, erank: 7.2781910896
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depth: 2, iteration: 300000, test_RMSE: 1.1261645555496216, erank: 7.1510543823
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depth: 2, iteration: 302000, test_RMSE: 1.1261358261108398, erank: 7.0280828475
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depth: 2, iteration: 304000, test_RMSE: 1.1261059045791626, erank: 6.9090852737
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depth: 2, iteration: 308000, test_RMSE: 1.1260426044464111, erank: 6.6825437545
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depth: 2, iteration: 310000, test_RMSE: 1.1260089874267578, erank: 6.5747308731
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depth: 2, iteration: 312000, test_RMSE: 1.1259740591049194, erank: 6.4704074859
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depth: 2, iteration: 316000, test_RMSE: 1.1258999109268188, erank: 6.2717218399
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depth: 2, iteration: 318000, test_RMSE: 1.1258608102798462, erank: 6.1771416664
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depth: 2, iteration: 324000, test_RMSE: 1.1257340908050537, erank: 5.9111385345
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depth: 2, iteration: 350000, test_RMSE: 1.1250033378601074, erank: 5.0138068199
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depth: 2, iteration: 362000, test_RMSE: 1.1245570182800293, erank: 4.7098617553
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depth: 2, iteration: 364000, test_RMSE: 1.1244759559631348, erank: 4.6646604537
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depth: 2, iteration: 368000, test_RMSE: 1.1243088245391846, erank: 4.5785317420
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256, s1: 5.084959030151367, s5: 0.2407425343990326
depth: 2, iteration: 388000, test_RMSE: 1.123399019241333, erank: 4.22424411773
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93994, s1: 5.7573394775390625, s5: 0.2645135819911957
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4917, s1: 6.770505428314209, s5: 0.2997850477695465
depth: 2, iteration: 402000, test_RMSE: 1.122772455215454, erank: 4.04123497009
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depth: 2, iteration: 404000, test_RMSE: 1.1226921081542969, erank: 4.0189208984
375, s1: 7.329975605010986, s5: 0.31908920407295227
depth: 2, iteration: 406000, test_RMSE: 1.1226154565811157, erank: 3.9975197315
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depth: 2, iteration: 418000, test_RMSE: 1.122269630432129, erank: 3.88724803924
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depth: 2, iteration: 474000, test_RMSE: 1.1278564929962158, erank: 3.7226548194
885254, s1: 22.729494094848633, s5: 0.9212673306465149
depth: 2, iteration: 476000, test_RMSE: 1.1284127235412598, erank: 3.7256913185
11963, s1: 23.27143669128418, s5: 0.9484575986862183
depth: 2, iteration: 478000, test_RMSE: 1.1289986371994019, erank: 3.7292320728
302, s1: 23.813657760620117, s5: 0.9763673543930054
depth: 2, iteration: 480000, test_RMSE: 1.1296144723892212, erank: 3.7332696914
67285, s1: 24.355480194091797, s5: 1.0049967765808105
depth: 2, iteration: 482000, test_RMSE: 1.1302599906921387, erank: 3.7377753257

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depth: 2, iteration: 484000, test_RMSE: 1.1309351921081543, erank: 3.7427384853
363037, s1: 25.436752319335938, s5: 1.0645502805709839
depth: 2, iteration: 486000, test_RMSE: 1.131639838218689, erank: 3.74815511703
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depth: 2, iteration: 488000, test_RMSE: 1.1323736906051636, erank: 3.7540013790
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depth: 2, iteration: 492000, test_RMSE: 1.1339279413223267, erank: 3.7669317722
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depth: 2, iteration: 494000, test_RMSE: 1.1347475051879883, erank: 3.7739920616
149902, s1: 28.099008560180664, s5: 1.227354884147644
depth: 2, iteration: 496000, test_RMSE: 1.1355949640274048, erank: 3.7814145088
1958, s1: 28.62078857421875, s5: 1.2624462842941284
depth: 2, iteration: 498000, test_RMSE: 1.1364694833755493, erank: 3.7892093658
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depth: 2, iteration: 500000, test_RMSE: 1.1373708248138428, erank: 3.7973468303
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depth: 2, iteration: 502000, test_RMSE: 1.1382982730865479, erank: 3.8058094978
33252, s1: 30.156064987182617, s5: 1.3730344772338867
depth: 2, iteration: 504000, test_RMSE: 1.1392511129379272, erank: 3.8145847320
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depth: 2, iteration: 506000, test_RMSE: 1.1402288675308228, erank: 3.8236646652
22168, s1: 31.151214599609375, s5: 1.4514076709747314
depth: 2, iteration: 508000, test_RMSE: 1.1412307024002075, erank: 3.8330266475
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depth: 2, iteration: 510000, test_RMSE: 1.1422559022903442, erank: 3.8426682949
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depth: 2, iteration: 512000, test_RMSE: 1.1433037519454956, erank: 3.8525624275
20752, s1: 32.5944938659668, s5: 1.576223373413086
depth: 2, iteration: 514000, test_RMSE: 1.1443736553192139, erank: 3.8627045154
571533, s1: 33.06134796142578, s5: 1.619848608970642
depth: 2, iteration: 516000, test_RMSE: 1.1454646587371826, erank: 3.8730943202
97241, s1: 33.52036666870117, s5: 1.664507269859314
depth: 2, iteration: 518000, test_RMSE: 1.146576166152954, erank: 3.88369250297
5464, s1: 33.971954345703125, s5: 1.710236668586731
depth: 2, iteration: 520000, test_RMSE: 1.147707223892212, erank: 3.89449095726
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depth: 2, iteration: 522000, test_RMSE: 1.1488572359085083, erank: 3.9054813385
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depth: 2, iteration: 524000, test_RMSE: 1.1500248908996582, erank: 3.9166598320
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depth: 2, iteration: 526000, test_RMSE: 1.151210069656372, erank: 3.92801785469
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depth: 2, iteration: 528000, test_RMSE: 1.152411699295044, erank: 3.93950891494
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83618, s1: 36.50974655151367, s5: 2.007784128189087
depth: 2, iteration: 532000, test_RMSE: 1.1548612117767334, erank: 3.9629416465
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depth: 2, iteration: 534000, test_RMSE: 1.1561074256896973, erank: 3.9748525619
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depth: 2, iteration: 536000, test_RMSE: 1.1573668718338013, erank: 3.9868831634

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396, s1: 38.39048767089844, s5: 2.2882869243621826
depth: 2, iteration: 542000, test_RMSE: 1.1612167358398438, erank: 4.0235691070
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916, s1: 39.08354568481445, s5: 2.409329891204834
depth: 2, iteration: 546000, test_RMSE: 1.1638356447219849, erank: 4.0484361648
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depth: 2, iteration: 550000, test_RMSE: 1.1664888858795166, erank: 4.0735793113
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depth: 2, iteration: 552000, test_RMSE: 1.1678266525268555, erank: 4.0862216949
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depth: 2, iteration: 566000, test_RMSE: 1.1773312091827393, erank: 4.1756467819
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depth: 2, iteration: 568000, test_RMSE: 1.1787010431289673, erank: 4.1884827613
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depth: 2, iteration: 570000, test_RMSE: 1.1800718307495117, erank: 4.2013344764
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depth: 2, iteration: 572000, test_RMSE: 1.1814426183700562, erank: 4.2141733169
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depth: 2, iteration: 574000, test_RMSE: 1.1828135251998901, erank: 4.2270154953
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depth: 2, iteration: 576000, test_RMSE: 1.1841834783554077, erank: 4.2398447990
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depth: 2, iteration: 578000, test_RMSE: 1.1855522394180298, erank: 4.2526640892
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depth: 2, iteration: 580000, test_RMSE: 1.1869187355041504, erank: 4.2654700279
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depth: 2, iteration: 582000, test_RMSE: 1.1882829666137695, erank: 4.2782559394
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depth: 2, iteration: 586000, test_RMSE: 1.1910014152526855, erank: 4.3037381172
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depth: 2, iteration: 590000, test_RMSE: 1.193703532218933, erank: 4.32912874221

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depth: 2, iteration: 596000, test_RMSE: 1.197719693183899, erank: 4.36695289611
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646, s1: 45.992584228515625, s5: 4.9472455978393555
depth: 2, iteration: 606000, test_RMSE: 1.204285740852356, erank: 4.42911529541
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depth: 2, iteration: 624000, test_RMSE: 1.215602159500122, erank: 4.53737449645
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depth: 2, iteration: 630000, test_RMSE: 1.219211220741272, erank: 4.57219505310
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depth: 2, iteration: 660000, test_RMSE: 1.2359838485717773, erank: 4.7345399856
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depth: 2, iteration: 666000, test_RMSE: 1.239089012145996, erank: 4.76437187194
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1001, s1: 48.99663543701172, s5: 9.424407005310059
depth: 2, iteration: 670000, test_RMSE: 1.2411162853240967, erank: 4.7837371826
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depth: 2, iteration: 682000, test_RMSE: 1.2469991445541382, erank: 4.8392386436
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depth: 2, iteration: 686000, test_RMSE: 1.2488970756530762, erank: 4.8568620681
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depth: 2, iteration: 702000, test_RMSE: 1.2561899423599243, erank: 4.9229259490
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depth: 2, iteration: 724000, test_RMSE: 1.265519142150879, erank: 5.00220966339
1113, s1: 50.16497039794922, s5: 14.650203704833984
depth: 2, iteration: 726000, test_RMSE: 1.266330361366272, erank: 5.00879383087
1582, s1: 50.19515609741211, s5: 14.850200653076172
depth: 2, iteration: 728000, test_RMSE: 1.2671359777450562, erank: 5.0152583122
25342, s1: 50.22356414794922, s5: 15.049517631530762
depth: 2, iteration: 730000, test_RMSE: 1.2679364681243896, erank: 5.0216135978
69873, s1: 50.251522064208984, s5: 15.248839378356934
depth: 2, iteration: 732000, test_RMSE: 1.268731713294983, erank: 5.02785682678
2227, s1: 50.27947235107422, s5: 15.448271751403809
depth: 2, iteration: 734000, test_RMSE: 1.2695205211639404, erank: 5.0340032577
51465, s1: 50.3064079284668, s5: 15.647919654846191
depth: 2, iteration: 736000, test_RMSE: 1.2703039646148682, erank: 5.0400424003
60107, s1: 50.332481384277344, s5: 15.84760856628418
depth: 2, iteration: 738000, test_RMSE: 1.271081805229187, erank: 5.04597616195
6787, s1: 50.359100341796875, s5: 16.047685623168945
depth: 2, iteration: 740000, test_RMSE: 1.271854043006897, erank: 5.05180883407
5928, s1: 50.3842658996582, s5: 16.24720573425293
depth: 2, iteration: 742000, test_RMSE: 1.2726209163665771, erank: 5.0575418472
29004, s1: 50.40944290161133, s5: 16.446876525878906
depth: 2, iteration: 744000, test_RMSE: 1.2733820676803589, erank: 5.0631756782
53174, s1: 50.434017181396484, s5: 16.646404266357422
depth: 2, iteration: 746000, test_RMSE: 1.2741384506225586, erank: 5.0687217712
40234, s1: 50.45806121826172, s5: 16.84580421447754
depth: 2, iteration: 748000, test_RMSE: 1.2748894691467285, erank: 5.0741715431
21338, s1: 50.48105239868164, s5: 17.044870376586914
depth: 2, iteration: 750000, test_RMSE: 1.275634765625, erank: 5.07951879501342
8, s1: 50.50404739379883, s5: 17.24344253540039
depth: 2, iteration: 752000, test_RMSE: 1.2763744592666626, erank: 5.0847764015

19775, s1: 50.526649475097656, s5: 17.44194793701172
depth: 2, iteration: 754000, test_RMSE: 1.2771093845367432, erank: 5.0899338722
229, s1: 50.54869079589844, s5: 17.639867782592773
depth: 2, iteration: 756000, test_RMSE: 1.2778401374816895, erank: 5.0949907302
856445, s1: 50.570682525634766, s5: 17.83733558654785
depth: 2, iteration: 758000, test_RMSE: 1.2785654067993164, erank: 5.0999641418
45703, s1: 50.59187316894531, s5: 18.0341739654541
depth: 2, iteration: 760000, test_RMSE: 1.2792857885360718, erank: 5.1048345565
7959, s1: 50.613243103027344, s5: 18.23040771484375
depth: 2, iteration: 762000, test_RMSE: 1.2800008058547974, erank: 5.1096138954
1626, s1: 50.63414764404297, s5: 18.425981521606445
depth: 2, iteration: 764000, test_RMSE: 1.2807115316390991, erank: 5.1143150329
58984, s1: 50.65439987182617, s5: 18.62093734741211
depth: 2, iteration: 766000, test_RMSE: 1.2814182043075562, erank: 5.1189303398
13232, s1: 50.674560546875, s5: 18.815629959106445
depth: 2, iteration: 768000, test_RMSE: 1.282119631767273, erank: 5.12345457077
0264, s1: 50.693782806396484, s5: 19.00919532775879
depth: 2, iteration: 770000, test_RMSE: 1.2828162908554077, erank: 5.1278867721
55762, s1: 50.7139778137207, s5: 19.202104568481445
depth: 2, iteration: 772000, test_RMSE: 1.28350830078125, erank: 5.132235527038
574, s1: 50.73311233520508, s5: 19.393993377685547
depth: 2, iteration: 774000, test_RMSE: 1.2841956615447998, erank: 5.1365036964
4165, s1: 50.75171661376953, s5: 19.584928512573242
depth: 2, iteration: 776000, test_RMSE: 1.2848776578903198, erank: 5.1406917572
02148, s1: 50.77029037475586, s5: 19.775108337402344
depth: 2, iteration: 778000, test_RMSE: 1.285553216934204, erank: 5.14479541778
56445, s1: 50.78831100463867, s5: 19.964000701904297
depth: 2, iteration: 780000, test_RMSE: 1.286224365234375, erank: 5.14881229400
6348, s1: 50.806182861328125, s5: 20.15190315246582
depth: 2, iteration: 782000, test_RMSE: 1.2868911027908325, erank: 5.1527581214
904785, s1: 50.82344436645508, s5: 20.338977813720703
depth: 2, iteration: 784000, test_RMSE: 1.287553071975708, erank: 5.15661764144
8975, s1: 50.84089660644531, s5: 20.52471923828125
depth: 2, iteration: 786000, test_RMSE: 1.2882102727890015, erank: 5.1604018211
36475, s1: 50.8579216003418, s5: 20.709362030029297
depth: 2, iteration: 788000, test_RMSE: 1.2888634204864502, erank: 5.1641025543
21289, s1: 50.874759674072266, s5: 20.8927059173584
depth: 2, iteration: 790000, test_RMSE: 1.2895126342773438, erank: 5.1677331924
43848, s1: 50.89174270629883, s5: 21.07496452331543
depth: 2, iteration: 792000, test_RMSE: 1.2901569604873657, erank: 5.1712999343
87207, s1: 50.908172607421875, s5: 21.256332397460938
depth: 2, iteration: 794000, test_RMSE: 1.290796160697937, erank: 5.17479085922
2412, s1: 50.924224853515625, s5: 21.43619155883789
depth: 2, iteration: 796000, test_RMSE: 1.2914307117462158, erank: 5.1782083511
35254, s1: 50.94004821777344, s5: 21.61481285095215
depth: 2, iteration: 798000, test_RMSE: 1.2920613288879395, erank: 5.1815433502
19727, s1: 50.95683288574219, s5: 21.79168701171875

RUN: python /content/content/synth/main.py --method DLNN --data gaussian --N 10
0 --rank 5 --reg_norm ratio --initscale 1e-3 --sample_size 4000 --log_interval
2000 --depth 2 --lam 0.0 --optim Adam --lr 1e-3 --niters 30000
depth: 2, iteration: 0, test_RMSE: 1.123241662979126, erank: 66.58731079101562,
s1: 0.002587410621345043, s5: 0.002140388358384371
depth: 2, iteration: 2000, test_RMSE: 1.3218019008636475, erank: 12.18548965454

1016, s1: 56.586700439453125, s5: 31.40473747253418
depth: 2, iteration: 4000, test_RMSE: 1.3218036890029907, erank: 12.18581485748
291, s1: 56.58657455444336, s5: 31.404823303222656
depth: 2, iteration: 6000, test_RMSE: 1.3218035697937012, erank: 12.18580532073
9746, s1: 56.58660125732422, s5: 31.40477180480957
depth: 2, iteration: 8000, test_RMSE: 1.3218036890029907, erank: 12.18583202362
0605, s1: 56.58553259277344, s5: 31.404489517211914
depth: 2, iteration: 10000, test_RMSE: 1.3217896223068237, erank: 12.1862878799
43848, s1: 56.58448028564453, s5: 31.40440559387207
depth: 2, iteration: 12000, test_RMSE: 1.3217631578445435, erank: 12.1888713836
66992, s1: 56.588375091552734, s5: 31.401304244995117
depth: 2, iteration: 14000, test_RMSE: 1.3216009140014648, erank: 12.1947174072
26562, s1: 56.55916213989258, s5: 31.402374267578125
depth: 2, iteration: 16000, test_RMSE: 1.3215597867965698, erank: 12.1990499496
45996, s1: 56.573646545410156, s5: 31.399080276489258
depth: 2, iteration: 18000, test_RMSE: 1.3213802576065063, erank: 12.2055196762
08496, s1: 56.52980041503906, s5: 31.399749755859375
depth: 2, iteration: 20000, test_RMSE: 1.3213927745819092, erank: 12.2092971801
75781, s1: 56.55703353881836, s5: 31.400169372558594
depth: 2, iteration: 22000, test_RMSE: 1.3211970329284668, erank: 12.2159099578
85742, s1: 56.52116012573242, s5: 31.393829345703125
depth: 2, iteration: 24000, test_RMSE: 1.3210071325302124, erank: 12.2225084304
80957, s1: 56.484275817871094, s5: 31.39174461364746
depth: 2, iteration: 26000, test_RMSE: 1.3209697008132935, erank: 12.2269277572
63184, s1: 56.505126953125, s5: 31.3922061920166
depth: 2, iteration: 28000, test_RMSE: 1.3208431005477905, erank: 12.2327299118
042, s1: 56.48236083984375, s5: 31.388839721679688

RUN: python /content/content/synth/main.py --method DLNN --data gaussian --N 10
0 --rank 5 --reg_norm ratio --initscale 1e-3 --sample_size 4000 --log_interval
2000 --depth 5 --lam 0.0 --optim GD --lr 1e-3 --niters 800000
depth: 5, iteration: 0, test_RMSE: 1.1190418004989624, erank: 44.3781814575195
3, s1: 0.0033922006841748953, s5: 0.002414506860077381
depth: 5, iteration: 2000, test_RMSE: 1.1190418004989624, erank: 44.37757110595
703, s1: 0.0033928570337593555, s5: 0.00241463421843946
depth: 5, iteration: 4000, test_RMSE: 1.1190418004989624, erank: 44.37694168090
82, s1: 0.003393491031602025, s5: 0.0024147694930434227
depth: 5, iteration: 6000, test_RMSE: 1.1190418004989624, erank: 44.37633132934
57, s1: 0.0033941222354769707, s5: 0.002414935501292348
depth: 5, iteration: 8000, test_RMSE: 1.1190418004989624, erank: 44.37559890747
07, s1: 0.0033947934862226248, s5: 0.0024151168763637543
depth: 5, iteration: 10000, test_RMSE: 1.1190418004989624, erank: 44.3748817443
84766, s1: 0.003395453095436096, s5: 0.002415270311757922
depth: 5, iteration: 12000, test_RMSE: 1.1190418004989624, erank: 44.3740959167
4805, s1: 0.003396125975996256, s5: 0.0024154691491276026
depth: 5, iteration: 14000, test_RMSE: 1.1190418004989624, erank: 44.3733253479
0039, s1: 0.0033967874478548765, s5: 0.0024156542494893074
depth: 5, iteration: 16000, test_RMSE: 1.1190418004989624, erank: 44.3725433349
6094, s1: 0.0033974824473261833, s5: 0.002415885915979743
depth: 5, iteration: 18000, test_RMSE: 1.1190418004989624, erank: 44.3717079162
59766, s1: 0.003398157889023423, s5: 0.0024161161854863167
depth: 5, iteration: 20000, test_RMSE: 1.1190418004989624, erank: 44.3707542419
4336, s1: 0.0033988668583333492, s5: 0.002416362753137946
depth: 5, iteration: 22000, test_RMSE: 1.1190418004989624, erank: 44.3698539733

8867, s1: 0.0033995741978287697, s5: 0.00241659814491868
depth: 5, iteration: 24000, test_RMSE: 1.1190418004989624, erank: 44.3689575195
3125, s1: 0.003400275483727455, s5: 0.002416873350739479
depth: 5, iteration: 26000, test_RMSE: 1.1190418004989624, erank: 44.3679847717
28516, s1: 0.0034009560476988554, s5: 0.002417145064100623
depth: 5, iteration: 28000, test_RMSE: 1.1190418004989624, erank: 44.3670005798
33984, s1: 0.0034016950521618128, s5: 0.002417417475953698
depth: 5, iteration: 30000, test_RMSE: 1.1190418004989624, erank: 44.3659629821
77734, s1: 0.0034024266060441732, s5: 0.002417722251266241
depth: 5, iteration: 32000, test_RMSE: 1.1190418004989624, erank: 44.3648948669
4336, s1: 0.0034031597897410393, s5: 0.0024180312175303698
depth: 5, iteration: 34000, test_RMSE: 1.1190418004989624, erank: 44.3638343811
03516, s1: 0.003403879003599286, s5: 0.0024183709174394608
depth: 5, iteration: 36000, test_RMSE: 1.1190418004989624, erank: 44.3627166748
0469, s1: 0.003404623130336404, s5: 0.0024186954833567142
depth: 5, iteration: 38000, test_RMSE: 1.1190418004989624, erank: 44.3615722656
25, s1: 0.003405394032597542, s5: 0.0024190470576286316
depth: 5, iteration: 40000, test_RMSE: 1.1190418004989624, erank: 44.3603897094
72656, s1: 0.0034061481710523367, s5: 0.00241939933039248
depth: 5, iteration: 42000, test_RMSE: 1.1190418004989624, erank: 44.3591842651
3672, s1: 0.003406909527257085, s5: 0.0024197658058825591
depth: 5, iteration: 44000, test_RMSE: 1.1190418004989624, erank: 44.3579788208
0078, s1: 0.0034076597075909376, s5: 0.002420164179056883
depth: 5, iteration: 46000, test_RMSE: 1.1190418004989624, erank: 44.3566780090
332, s1: 0.0034084341023117304, s5: 0.0024205443914979696
depth: 5, iteration: 48000, test_RMSE: 1.1190418004989624, erank: 44.3553962707
5195, s1: 0.0034092082642018795, s5: 0.0024209723342210054
depth: 5, iteration: 50000, test_RMSE: 1.1190418004989624, erank: 44.3540534973
1445, s1: 0.0034100064076483325, s5: 0.002421384211629629
depth: 5, iteration: 52000, test_RMSE: 1.1190418004989624, erank: 44.3526687622
0703, s1: 0.0034107991959899664, s5: 0.002421818440780436
depth: 5, iteration: 54000, test_RMSE: 1.1190418004989624, erank: 44.3513145446
77734, s1: 0.0034115908201783895, s5: 0.002422272926196456
depth: 5, iteration: 56000, test_RMSE: 1.1190418004989624, erank: 44.3498802185
0586, s1: 0.003412387100979686, s5: 0.002422739751636982
depth: 5, iteration: 58000, test_RMSE: 1.1190418004989624, erank: 44.3484268188
47656, s1: 0.0034132145810872316, s5: 0.0024232068099081516
depth: 5, iteration: 60000, test_RMSE: 1.1190418004989624, erank: 44.3469581604
0039, s1: 0.003414023434743285, s5: 0.002423695055767894
depth: 5, iteration: 62000, test_RMSE: 1.1190418004989624, erank: 44.3454589843
75, s1: 0.0034148520790040493, s5: 0.0024241660721600056
depth: 5, iteration: 64000, test_RMSE: 1.1190418004989624, erank: 44.3439025878
90625, s1: 0.003415695857256651, s5: 0.0024246980901807547
depth: 5, iteration: 66000, test_RMSE: 1.1190418004989624, erank: 44.3422660827
6367, s1: 0.003416521707549691, s5: 0.0024252254515886307
depth: 5, iteration: 68000, test_RMSE: 1.1190418004989624, erank: 44.3407669067
3828, s1: 0.003417385509237647, s5: 0.0024257362820208073
depth: 5, iteration: 70000, test_RMSE: 1.1190418004989624, erank: 44.3390502929
6875, s1: 0.0034182334784418344, s5: 0.0024262883234769106
depth: 5, iteration: 72000, test_RMSE: 1.1190418004989624, erank: 44.3374023437
5, s1: 0.0034191147424280643, s5: 0.002426826860755682
depth: 5, iteration: 74000, test_RMSE: 1.1190418004989624, erank: 44.3357772827
14844, s1: 0.0034199676010757685, s5: 0.002427408704534173
depth: 5, iteration: 76000, test_RMSE: 1.1190418004989624, erank: 44.3340225219

72656, s1: 0.00342087331279582, s5: 0.002427983796223998
depth: 5, iteration: 78000, test_RMSE: 1.1190418004989624, erank: 44.3322219848
6328, s1: 0.003421757137402892, s5: 0.002428583335131407
depth: 5, iteration: 80000, test_RMSE: 1.1190418004989624, erank: 44.3304901123
0469, s1: 0.003422666108235717, s5: 0.0024291689042001963
depth: 5, iteration: 82000, test_RMSE: 1.1190418004989624, erank: 44.3286628723
1445, s1: 0.0034235480707138777, s5: 0.0024298045318573713
depth: 5, iteration: 84000, test_RMSE: 1.1190418004989624, erank: 44.3268241882
3242, s1: 0.0034244635608047247, s5: 0.0024304210674017668
depth: 5, iteration: 86000, test_RMSE: 1.1190418004989624, erank: 44.3249740600
58594, s1: 0.0034253804478794336, s5: 0.0024310618173331022
depth: 5, iteration: 88000, test_RMSE: 1.1190418004989624, erank: 44.3230934143
0664, s1: 0.0034263061825186014, s5: 0.002431709785014391
depth: 5, iteration: 90000, test_RMSE: 1.1190418004989624, erank: 44.3211708068
84766, s1: 0.003427231451496482, s5: 0.002432384295389056
depth: 5, iteration: 92000, test_RMSE: 1.1190418004989624, erank: 44.3192024230
957, s1: 0.0034281802363693714, s5: 0.002433063695207238
depth: 5, iteration: 94000, test_RMSE: 1.1190418004989624, erank: 44.3172073364
2578, s1: 0.003429120173677802, s5: 0.0024337489157915115
depth: 5, iteration: 96000, test_RMSE: 1.1190418004989624, erank: 44.3152389526
3672, s1: 0.003430065931752324, s5: 0.0024344611447304487
depth: 5, iteration: 98000, test_RMSE: 1.1190418004989624, erank: 44.3132209777
832, s1: 0.0034310088958591223, s5: 0.0024351736065000296
depth: 5, iteration: 100000, test_RMSE: 1.1190418004989624, erank: 44.311130523
68164, s1: 0.0034319853875786066, s5: 0.002435911213979125
depth: 5, iteration: 102000, test_RMSE: 1.1190418004989624, erank: 44.309040069
58008, s1: 0.00343296374194324, s5: 0.0024366413708776236
depth: 5, iteration: 104000, test_RMSE: 1.1190418004989624, erank: 44.306930541
99219, s1: 0.00343391764909029, s5: 0.002437400398775935
depth: 5, iteration: 106000, test_RMSE: 1.1190418004989624, erank: 44.304782867
43164, s1: 0.00343490531668067, s5: 0.002438183641061187
depth: 5, iteration: 108000, test_RMSE: 1.1190418004989624, erank: 44.302616119
384766, s1: 0.003435884602367878, s5: 0.0024389412719756365
depth: 5, iteration: 110000, test_RMSE: 1.1190418004989624, erank: 44.300411224
365234, s1: 0.003436870640143752, s5: 0.0024397592060267925
depth: 5, iteration: 112000, test_RMSE: 1.1190418004989624, erank: 44.298171997
07031, s1: 0.003437869716435671, s5: 0.002440547803416848
depth: 5, iteration: 114000, test_RMSE: 1.1190418004989624, erank: 44.295886993
4082, s1: 0.003438887419179082, s5: 0.0024413897190243006
depth: 5, iteration: 116000, test_RMSE: 1.1190418004989624, erank: 44.293556213
378906, s1: 0.0034399277064949274, s5: 0.002442223485559225
depth: 5, iteration: 118000, test_RMSE: 1.1190418004989624, erank: 44.291221618
652344, s1: 0.0034409519284963608, s5: 0.0024430935736745596
depth: 5, iteration: 120000, test_RMSE: 1.1190418004989624, erank: 44.288837432
86133, s1: 0.0034419840667396784, s5: 0.0024439569097001228
depth: 5, iteration: 122000, test_RMSE: 1.1190418004989624, erank: 44.286460876
464844, s1: 0.0034430345986038446, s5: 0.002444847021251917
depth: 5, iteration: 124000, test_RMSE: 1.1190418004989624, erank: 44.284019470
214844, s1: 0.0034440727904438972, s5: 0.0024457299150526524
depth: 5, iteration: 126000, test_RMSE: 1.1190418004989624, erank: 44.281581878
66211, s1: 0.00344513775780797, s5: 0.0024466149043291807
depth: 5, iteration: 128000, test_RMSE: 1.1190418004989624, erank: 44.279067993
16406, s1: 0.003446197835728526, s5: 0.002447534818202257
depth: 5, iteration: 130000, test_RMSE: 1.1190418004989624, erank: 44.276565551

75781, s1: 0.003447265364229679, s5: 0.0024484735913574696
depth: 5, iteration: 132000, test_RMSE: 1.1190418004989624, erank: 44.273960113
52539, s1: 0.003448343137279153, s5: 0.0024493986275047064
depth: 5, iteration: 134000, test_RMSE: 1.1190418004989624, erank: 44.271427154
541016, s1: 0.0034494332503527403, s5: 0.002450318541377783
depth: 5, iteration: 136000, test_RMSE: 1.1190418004989624, erank: 44.268806457
51953, s1: 0.003450539894402027, s5: 0.0024512920062988997
depth: 5, iteration: 138000, test_RMSE: 1.1190418004989624, erank: 44.266136169
433594, s1: 0.0034516246523708105, s5: 0.002452271990478039
depth: 5, iteration: 140000, test_RMSE: 1.1190418004989624, erank: 44.263500213
62305, s1: 0.0034527601674199104, s5: 0.0024532382376492023
depth: 5, iteration: 142000, test_RMSE: 1.1190418004989624, erank: 44.260807037
353516, s1: 0.003453847486525774, s5: 0.0024542200844734907
depth: 5, iteration: 144000, test_RMSE: 1.1190418004989624, erank: 44.258129119
87305, s1: 0.0034549913834780455, s5: 0.0024552394170314074
depth: 5, iteration: 146000, test_RMSE: 1.1190418004989624, erank: 44.255363464
35547, s1: 0.0034561019856482744, s5: 0.0024562543258070946
depth: 5, iteration: 148000, test_RMSE: 1.1190418004989624, erank: 44.252548217
77344, s1: 0.003457245882600546, s5: 0.002457310678437352
depth: 5, iteration: 150000, test_RMSE: 1.1190418004989624, erank: 44.249759674
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depth: 5, iteration: 152000, test_RMSE: 1.1190418004989624, erank: 44.246925354
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33008, s1: 0.003460667561739683, s5: 0.002460507908836007
depth: 5, iteration: 156000, test_RMSE: 1.1190418004989624, erank: 44.241230010
98633, s1: 0.0034618168137967587, s5: 0.002461578929796815
depth: 5, iteration: 158000, test_RMSE: 1.1190418004989624, erank: 44.238296508
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depth: 5, iteration: 160000, test_RMSE: 1.1190418004989624, erank: 44.235332489
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depth: 5, iteration: 162000, test_RMSE: 1.1190418004989624, erank: 44.232391357
421875, s1: 0.003465348621830344, s5: 0.0024649070110172033
depth: 5, iteration: 164000, test_RMSE: 1.1190418004989624, erank: 44.229373931
884766, s1: 0.0034665714483708143, s5: 0.002466043923050165
depth: 5, iteration: 166000, test_RMSE: 1.1190418004989624, erank: 44.226367950
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depth: 5, iteration: 168000, test_RMSE: 1.1190418004989624, erank: 44.223320007
32422, s1: 0.003468916052952409, s5: 0.00246836943551898
depth: 5, iteration: 170000, test_RMSE: 1.1190418004989624, erank: 44.220306396
484375, s1: 0.003470106516033411, s5: 0.0024695314932614565
depth: 5, iteration: 172000, test_RMSE: 1.1190418004989624, erank: 44.217144012
45117, s1: 0.003471310483291745, s5: 0.0024707240518182516
depth: 5, iteration: 174000, test_RMSE: 1.1190418004989624, erank: 44.213958740
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depth: 5, iteration: 176000, test_RMSE: 1.1190418004989624, erank: 44.210849761
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depth: 5, iteration: 178000, test_RMSE: 1.1190418004989624, erank: 44.207679748
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depth: 5, iteration: 180000, test_RMSE: 1.1190418004989624, erank: 44.204433441
16211, s1: 0.0034761896822601557, s5: 0.0024755988270044327
depth: 5, iteration: 182000, test_RMSE: 1.1190418004989624, erank: 44.201164245
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depth: 5, iteration: 184000, test_RMSE: 1.1190418004989624, erank: 44.197864532

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depth: 5, iteration: 186000, test_RMSE: 1.1190418004989624, erank: 44.194568634
0332, s1: 0.003479942912235856, s5: 0.0024793606717139482
depth: 5, iteration: 188000, test_RMSE: 1.1190418004989624, erank: 44.191219329
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depth: 5, iteration: 190000, test_RMSE: 1.1190418004989624, erank: 44.187824249
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depth: 5, iteration: 192000, test_RMSE: 1.1190418004989624, erank: 44.184440612
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depth: 5, iteration: 194000, test_RMSE: 1.1190418004989624, erank: 44.181011199
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depth: 5, iteration: 198000, test_RMSE: 1.1190418004989624, erank: 44.174110412
597656, s1: 0.003487688722088933, s5: 0.002487179823219776
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95703, s1: 0.003489036811515689, s5: 0.002488546771928668
depth: 5, iteration: 202000, test_RMSE: 1.1190418004989624, erank: 44.167053222
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depth: 5, iteration: 204000, test_RMSE: 1.1190418004989624, erank: 44.163494110
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depth: 5, iteration: 206000, test_RMSE: 1.1190418004989624, erank: 44.159820556
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depth: 5, iteration: 208000, test_RMSE: 1.1190418004989624, erank: 44.15625, s
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depth: 5, iteration: 212000, test_RMSE: 1.1190418004989624, erank: 44.148818969
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depth: 5, iteration: 216000, test_RMSE: 1.1190418004989624, erank: 44.141483306
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depth: 5, iteration: 218000, test_RMSE: 1.1190418004989624, erank: 44.137653350
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depth: 5, iteration: 220000, test_RMSE: 1.1190418004989624, erank: 44.133895874
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depth: 5, iteration: 222000, test_RMSE: 1.1190418004989624, erank: 44.130065917
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depth: 5, iteration: 224000, test_RMSE: 1.1190418004989624, erank: 44.126224517
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depth: 5, iteration: 226000, test_RMSE: 1.1190418004989624, erank: 44.122333526
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depth: 5, iteration: 228000, test_RMSE: 1.1190418004989624, erank: 44.118396759
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depth: 5, iteration: 230000, test_RMSE: 1.1190418004989624, erank: 44.114444732
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depth: 5, iteration: 236000, test_RMSE: 1.1190418004989624, erank: 44.102394104
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depth: 5, iteration: 238000, test_RMSE: 1.1190418004989624, erank: 44.098335266

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depth: 5, iteration: 242000, test_RMSE: 1.1190418004989624, erank: 44.090061187
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depth: 5, iteration: 246000, test_RMSE: 1.1190418004989624, erank: 44.081691741
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depth: 5, iteration: 248000, test_RMSE: 1.1190418004989624, erank: 44.077449798
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depth: 5, iteration: 250000, test_RMSE: 1.1190418004989624, erank: 44.073192596
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depth: 5, iteration: 256000, test_RMSE: 1.1190418004989624, erank: 44.060218811
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depth: 5, iteration: 260000, test_RMSE: 1.1190418004989624, erank: 44.051433563
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depth: 5, iteration: 262000, test_RMSE: 1.1190418004989624, erank: 44.046951293
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depth: 5, iteration: 264000, test_RMSE: 1.1190418004989624, erank: 44.042510986
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depth: 5, iteration: 268000, test_RMSE: 1.1190418004989624, erank: 44.033458709
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depth: 5, iteration: 270000, test_RMSE: 1.1190418004989624, erank: 44.028911590
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depth: 5, iteration: 274000, test_RMSE: 1.1190418004989624, erank: 44.019687652
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depth: 5, iteration: 278000, test_RMSE: 1.1190418004989624, erank: 44.010391235
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depth: 5, iteration: 282000, test_RMSE: 1.1190418004989624, erank: 44.000968933
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depth: 5, iteration: 284000, test_RMSE: 1.1190418004989624, erank: 43.996162414
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depth: 5, iteration: 288000, test_RMSE: 1.1190418004989624, erank: 43.986522674
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depth: 5, iteration: 290000, test_RMSE: 1.1190418004989624, erank: 43.981658935
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depth: 5, iteration: 298000, test_RMSE: 1.1190418004989624, erank: 43.961948394
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depth: 5, iteration: 300000, test_RMSE: 1.1190418004989624, erank: 43.956951141
35742, s1: 0.0035657130647450686, s5: 0.0025696423836052418
depth: 5, iteration: 302000, test_RMSE: 1.1190418004989624, erank: 43.951908111
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depth: 5, iteration: 304000, test_RMSE: 1.1190418004989624, erank: 43.946857452
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depth: 5, iteration: 306000, test_RMSE: 1.1190418004989624, erank: 43.941722869
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depth: 5, iteration: 310000, test_RMSE: 1.1190418004989624, erank: 43.931404113
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depth: 5, iteration: 318000, test_RMSE: 1.1190418004989624, erank: 43.910442352
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depth: 5, iteration: 320000, test_RMSE: 1.1190418004989624, erank: 43.905136108
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375, s1: 0.0035896324552595615, s5: 0.0025934174191206694
depth: 5, iteration: 328000, test_RMSE: 1.119041919708252, erank: 43.8835678100
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depth: 5, iteration: 330000, test_RMSE: 1.119041919708252, erank: 43.8780403137
207, s1: 0.003593625733628869, s5: 0.002597056794911623
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depth: 5, iteration: 334000, test_RMSE: 1.119041919708252, erank: 43.8670997619
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depth: 5, iteration: 336000, test_RMSE: 1.1190418004989624, erank: 43.861545562
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depth: 5, iteration: 338000, test_RMSE: 1.1190418004989624, erank: 43.855911254
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depth: 5, iteration: 340000, test_RMSE: 1.1190418004989624, erank: 43.850265502
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depth: 5, iteration: 342000, test_RMSE: 1.1190418004989624, erank: 43.844684600
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depth: 5, iteration: 344000, test_RMSE: 1.1190418004989624, erank: 43.838966369
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depth: 5, iteration: 346000, test_RMSE: 1.1190418004989624, erank: 43.833301544

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depth: 5, iteration: 348000, test_RMSE: 1.1190418004989624, erank: 43.827522277
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depth: 5, iteration: 352000, test_RMSE: 1.119041919708252, erank: 43.8159675598
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depth: 5, iteration: 354000, test_RMSE: 1.1190418004989624, erank: 43.810104370
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depth: 5, iteration: 356000, test_RMSE: 1.1190418004989624, erank: 43.804218292
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depth: 5, iteration: 358000, test_RMSE: 1.1190418004989624, erank: 43.798316955
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depth: 5, iteration: 360000, test_RMSE: 1.1190418004989624, erank: 43.792366027
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depth: 5, iteration: 364000, test_RMSE: 1.1190418004989624, erank: 43.780445098
87695, s1: 0.0036286169197410345, s5: 0.002625834196805954
depth: 5, iteration: 366000, test_RMSE: 1.1190418004989624, erank: 43.774433135
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depth: 5, iteration: 368000, test_RMSE: 1.1190418004989624, erank: 43.768337249
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depth: 5, iteration: 370000, test_RMSE: 1.1190418004989624, erank: 43.762245178
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depth: 5, iteration: 372000, test_RMSE: 1.1190418004989624, erank: 43.756160736
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depth: 5, iteration: 374000, test_RMSE: 1.1190418004989624, erank: 43.749992370
60547, s1: 0.0036395585630089045, s5: 0.002633207244798541
depth: 5, iteration: 376000, test_RMSE: 1.1190418004989624, erank: 43.743831634
521484, s1: 0.003641788847744465, s5: 0.0026345811784267426
depth: 5, iteration: 378000, test_RMSE: 1.1190418004989624, erank: 43.737541198
73047, s1: 0.003644044976681471, s5: 0.0026359285693615675
depth: 5, iteration: 380000, test_RMSE: 1.119041919708252, erank: 43.7312965393
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depth: 5, iteration: 382000, test_RMSE: 1.119041919708252, erank: 43.7249679565
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depth: 5, iteration: 384000, test_RMSE: 1.119041919708252, erank: 43.7186088562
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depth: 5, iteration: 386000, test_RMSE: 1.119041919708252, erank: 43.7123336791
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depth: 5, iteration: 392000, test_RMSE: 1.119041919708252, erank: 43.6930465698
2422, s1: 0.0036601065658032894, s5: 0.0026446054689586163
depth: 5, iteration: 394000, test_RMSE: 1.119041919708252, erank: 43.6865501403
8086, s1: 0.003662438364699483, s5: 0.0026457204949110746
depth: 5, iteration: 396000, test_RMSE: 1.119041919708252, erank: 43.6800575256
34766, s1: 0.0036648043897002935, s5: 0.0026467943098396063
depth: 5, iteration: 398000, test_RMSE: 1.119041919708252, erank: 43.6735534667
96875, s1: 0.003667151555418968, s5: 0.00264785741455853
depth: 5, iteration: 400000, test_RMSE: 1.119041919708252, erank: 43.6669578552

2461, s1: 0.00366957182995975, s5: 0.0026488699950277805
depth: 5, iteration: 402000, test_RMSE: 1.119041919708252, erank: 43.6603622436
52344, s1: 0.0036719748750329018, s5: 0.002649850444868207
depth: 5, iteration: 404000, test_RMSE: 1.119041919708252, erank: 43.6537628173
8281, s1: 0.003674384206533432, s5: 0.0026508206501603127
depth: 5, iteration: 406000, test_RMSE: 1.119041919708252, erank: 43.6470489501
9531, s1: 0.0036768238060176373, s5: 0.0026517563965171576
depth: 5, iteration: 408000, test_RMSE: 1.119041919708252, erank: 43.6403579711
91406, s1: 0.00367923965677619, s5: 0.0026526853907853365
depth: 5, iteration: 410000, test_RMSE: 1.119041919708252, erank: 43.6336174011
2305, s1: 0.003681708825752139, s5: 0.0026535720098763704
depth: 5, iteration: 412000, test_RMSE: 1.1190418004989624, erank: 43.626834869
384766, s1: 0.003684175666421652, s5: 0.0026544590946286917
depth: 5, iteration: 414000, test_RMSE: 1.1190418004989624, erank: 43.620075225
83008, s1: 0.003686648327857256, s5: 0.0026552921626716852
depth: 5, iteration: 416000, test_RMSE: 1.1190418004989624, erank: 43.613124847
41211, s1: 0.003689168719574809, s5: 0.002656123833730817
depth: 5, iteration: 418000, test_RMSE: 1.119041919708252, erank: 43.6062660217
28516, s1: 0.003691658843308687, s5: 0.0026569305919110775
depth: 5, iteration: 420000, test_RMSE: 1.1190418004989624, erank: 43.599300384
521484, s1: 0.0036942108999937773, s5: 0.002657728036865592
depth: 5, iteration: 422000, test_RMSE: 1.1190418004989624, erank: 43.592376708
984375, s1: 0.0036967401392757893, s5: 0.0026584900091562271
depth: 5, iteration: 424000, test_RMSE: 1.1190418004989624, erank: 43.585380554
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depth: 5, iteration: 426000, test_RMSE: 1.1190418004989624, erank: 43.578361511
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depth: 5, iteration: 428000, test_RMSE: 1.119041919708252, erank: 43.5713043212
8906, s1: 0.0037044694181531668, s5: 0.0026607185136526823
depth: 5, iteration: 430000, test_RMSE: 1.1190418004989624, erank: 43.564243316
65039, s1: 0.0037070405669510365, s5: 0.002661404898390174
depth: 5, iteration: 432000, test_RMSE: 1.119041919708252, erank: 43.5571479797
3633, s1: 0.0037096571177244186, s5: 0.002662093611434102
depth: 5, iteration: 434000, test_RMSE: 1.1190418004989624, erank: 43.550003051
75781, s1: 0.003712311154231429, s5: 0.0026627976913005114
depth: 5, iteration: 436000, test_RMSE: 1.1190418004989624, erank: 43.542808532
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depth: 5, iteration: 438000, test_RMSE: 1.1190418004989624, erank: 43.535572052
00195, s1: 0.003717648098245263, s5: 0.002664108294993639
depth: 5, iteration: 440000, test_RMSE: 1.1190418004989624, erank: 43.528339385
98633, s1: 0.00372034078463912, s5: 0.0026647341437637806
depth: 5, iteration: 442000, test_RMSE: 1.1190418004989624, erank: 43.521015167
23633, s1: 0.00372305978089571, s5: 0.0026653532404452562
depth: 5, iteration: 444000, test_RMSE: 1.1190418004989624, erank: 43.513740539
55078, s1: 0.003725743852555752, s5: 0.0026659714058041573
depth: 5, iteration: 446000, test_RMSE: 1.1190418004989624, erank: 43.506355285
64453, s1: 0.003728515235707164, s5: 0.002666591899469495
depth: 5, iteration: 448000, test_RMSE: 1.1190418004989624, erank: 43.498939514
160156, s1: 0.003731281030923128, s5: 0.002667180262506008
depth: 5, iteration: 450000, test_RMSE: 1.1190418004989624, erank: 43.491523742
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depth: 5, iteration: 452000, test_RMSE: 1.1190418004989624, erank: 43.484046936
035156, s1: 0.003736840793862939, s5: 0.0026683672331273556
depth: 5, iteration: 454000, test_RMSE: 1.1190418004989624, erank: 43.476573944

0918, s1: 0.0037396426778286695, s5: 0.002668951405212283
depth: 5, iteration: 456000, test_RMSE: 1.1190418004989624, erank: 43.469047546
38672, s1: 0.0037424350157380104, s5: 0.0026695169508457184
depth: 5, iteration: 458000, test_RMSE: 1.1190418004989624, erank: 43.461452484
13086, s1: 0.0037452985998243093, s5: 0.002670089714229107
depth: 5, iteration: 460000, test_RMSE: 1.1190418004989624, erank: 43.453891754
15039, s1: 0.0037481465842574835, s5: 0.002670660149306059
depth: 5, iteration: 462000, test_RMSE: 1.1190418004989624, erank: 43.446315765
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depth: 5, iteration: 464000, test_RMSE: 1.119041919708252, erank: 43.4386215209
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depth: 5, iteration: 466000, test_RMSE: 1.1190418004989624, erank: 43.430976867
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depth: 5, iteration: 468000, test_RMSE: 1.119041919708252, erank: 43.4232330322
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depth: 5, iteration: 470000, test_RMSE: 1.119041919708252, erank: 43.4154930114
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depth: 5, iteration: 472000, test_RMSE: 1.1190418004989624, erank: 43.407695770
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depth: 5, iteration: 474000, test_RMSE: 1.1190418004989624, erank: 43.399864196
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depth: 5, iteration: 476000, test_RMSE: 1.1190418004989624, erank: 43.392021179
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95117, s1: 0.00377468578517437, s5: 0.002675592200830579
depth: 5, iteration: 480000, test_RMSE: 1.1190418004989624, erank: 43.376235961
91406, s1: 0.003777709323912859, s5: 0.0026761286426335573
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depth: 5, iteration: 484000, test_RMSE: 1.119041919708252, erank: 43.3602714538
5742, s1: 0.0037838579155504704, s5: 0.002677195006981492
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535156, s1: 0.003786975285038352, s5: 0.002677739132195711
depth: 5, iteration: 488000, test_RMSE: 1.1190418004989624, erank: 43.344177246
09375, s1: 0.0037900744937360287, s5: 0.0026782469358295202
depth: 5, iteration: 490000, test_RMSE: 1.1190418004989624, erank: 43.336116790
771484, s1: 0.0037931972183287144, s5: 0.002678787801414728
depth: 5, iteration: 492000, test_RMSE: 1.1190418004989624, erank: 43.327926635
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depth: 5, iteration: 496000, test_RMSE: 1.1190418004989624, erank: 43.311569213
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depth: 5, iteration: 498000, test_RMSE: 1.1190418004989624, erank: 43.303264617
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depth: 5, iteration: 502000, test_RMSE: 1.1190418004989624, erank: 43.286647796
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depth: 5, iteration: 504000, test_RMSE: 1.1190418004989624, erank: 43.278270721
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depth: 5, iteration: 506000, test_RMSE: 1.1190418004989624, erank: 43.269870758
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depth: 5, iteration: 508000, test_RMSE: 1.1190418004989624, erank: 43.261451721

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depth: 5, iteration: 514000, test_RMSE: 1.1190418004989624, erank: 43.235881805
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depth: 5, iteration: 526000, test_RMSE: 1.1190418004989624, erank: 43.183937072
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depth: 5, iteration: 532000, test_RMSE: 1.1190418004989624, erank: 43.157463073
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depth: 5, iteration: 534000, test_RMSE: 1.1190418004989624, erank: 43.148616790
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depth: 5, iteration: 536000, test_RMSE: 1.1190418004989624, erank: 43.139671325
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depth: 5, iteration: 538000, test_RMSE: 1.1190418004989624, erank: 43.130718231
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depth: 5, iteration: 540000, test_RMSE: 1.1190418004989624, erank: 43.121734619
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depth: 5, iteration: 542000, test_RMSE: 1.1190418004989624, erank: 43.112667083
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depth: 5, iteration: 546000, test_RMSE: 1.1190418004989624, erank: 43.094539642
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depth: 5, iteration: 548000, test_RMSE: 1.1190418004989624, erank: 43.085384368
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depth: 5, iteration: 550000, test_RMSE: 1.1190418004989624, erank: 43.076267242
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depth: 5, iteration: 552000, test_RMSE: 1.1190418004989624, erank: 43.067073822
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depth: 5, iteration: 554000, test_RMSE: 1.1190418004989624, erank: 43.057865142
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depth: 5, iteration: 556000, test_RMSE: 1.1190418004989624, erank: 43.048595428
4668, s1: 0.003907815087586641, s5: 0.0026968899182975292
depth: 5, iteration: 558000, test_RMSE: 1.1190418004989624, erank: 43.039295196
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depth: 5, iteration: 560000, test_RMSE: 1.1190418004989624, erank: 43.029918670
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depth: 5, iteration: 562000, test_RMSE: 1.1190418004989624, erank: 43.020565032

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depth: 5, iteration: 564000, test_RMSE: 1.1190418004989624, erank: 43.011199951
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depth: 5, iteration: 566000, test_RMSE: 1.1190418004989624, erank: 43.001796722
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depth: 5, iteration: 570000, test_RMSE: 1.1190418004989624, erank: 42.982833862
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depth: 5, iteration: 572000, test_RMSE: 1.1190418004989624, erank: 42.973304748
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depth: 5, iteration: 586000, test_RMSE: 1.1190418004989624, erank: 42.905460357
666016, s1: 0.003967939410358667, s5: 0.0027058934792876244
depth: 5, iteration: 588000, test_RMSE: 1.1190418004989624, erank: 42.895622253
41797, s1: 0.003972124774008989, s5: 0.002706507220864296
depth: 5, iteration: 590000, test_RMSE: 1.1190418004989624, erank: 42.885734558
10547, s1: 0.003976336680352688, s5: 0.0027071319054812193
depth: 5, iteration: 592000, test_RMSE: 1.1190418004989624, erank: 42.875816345
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depth: 5, iteration: 594000, test_RMSE: 1.1190418004989624, erank: 42.865848541
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depth: 5, iteration: 596000, test_RMSE: 1.1190418004989624, erank: 42.855857849
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depth: 5, iteration: 598000, test_RMSE: 1.1190418004989624, erank: 42.845752716
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depth: 5, iteration: 600000, test_RMSE: 1.1190418004989624, erank: 42.835659027
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depth: 5, iteration: 602000, test_RMSE: 1.1190418004989624, erank: 42.825500488
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depth: 5, iteration: 604000, test_RMSE: 1.1190418004989624, erank: 42.815280914
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depth: 5, iteration: 606000, test_RMSE: 1.1190418004989624, erank: 42.805011749
26758, s1: 0.004011193756014109, s5: 0.0027123072650283575
depth: 5, iteration: 608000, test_RMSE: 1.1190418004989624, erank: 42.794788360
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depth: 5, iteration: 610000, test_RMSE: 1.1190418004989624, erank: 42.784431457
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depth: 5, iteration: 612000, test_RMSE: 1.1190418004989624, erank: 42.774082183
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depth: 5, iteration: 614000, test_RMSE: 1.1190418004989624, erank: 42.76367187
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depth: 5, iteration: 616000, test_RMSE: 1.1190418004989624, erank: 42.753219604

49219, s1: 0.004033870995044708, s5: 0.0027157459408044815
depth: 5, iteration: 618000, test_RMSE: 1.1190418004989624, erank: 42.742733001
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depth: 5, iteration: 620000, test_RMSE: 1.1190418004989624, erank: 42.732204437
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depth: 5, iteration: 622000, test_RMSE: 1.1190418004989624, erank: 42.721641540
527344, s1: 0.004047747701406479, s5: 0.0027179191820323467
depth: 5, iteration: 624000, test_RMSE: 1.1190418004989624, erank: 42.711002349
853516, s1: 0.004052469972521067, s5: 0.0027186423540115356
depth: 5, iteration: 626000, test_RMSE: 1.1190418004989624, erank: 42.700408935
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depth: 5, iteration: 628000, test_RMSE: 1.1190418004989624, erank: 42.689682006
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625, s1: 0.004071503411978483, s5: 0.002721628872677684
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depth: 5, iteration: 640000, test_RMSE: 1.1190418004989624, erank: 42.624622344
9707, s1: 0.004090987611562014, s5: 0.0027247178368270397
depth: 5, iteration: 642000, test_RMSE: 1.1190418004989624, erank: 42.613689422
60742, s1: 0.004095888696610928, s5: 0.0027254882734268904
depth: 5, iteration: 644000, test_RMSE: 1.1190418004989624, erank: 42.602634429
93164, s1: 0.004100858233869076, s5: 0.0027262752410024405
depth: 5, iteration: 646000, test_RMSE: 1.1190418004989624, erank: 42.591567993
16406, s1: 0.004105811007320881, s5: 0.002727069891989231
depth: 5, iteration: 648000, test_RMSE: 1.1190418004989624, erank: 42.580410003
66211, s1: 0.004110821522772312, s5: 0.0027278943452984095
depth: 5, iteration: 650000, test_RMSE: 1.1190418004989624, erank: 42.569313049
316406, s1: 0.0041158683598041534, s5: 0.0027287018019706011
depth: 5, iteration: 652000, test_RMSE: 1.1190418004989624, erank: 42.558120727
53906, s1: 0.004120916128158569, s5: 0.0027295241598039865
depth: 5, iteration: 654000, test_RMSE: 1.1190418004989624, erank: 42.546901702
88086, s1: 0.004125983454287052, s5: 0.0027303530368953943
depth: 5, iteration: 656000, test_RMSE: 1.1190418004989624, erank: 42.535682678
222656, s1: 0.004131114576011896, s5: 0.0027310519944876432
depth: 5, iteration: 658000, test_RMSE: 1.1190418004989624, erank: 42.524337768
55469, s1: 0.004136222414672375, s5: 0.002731981687247753
depth: 5, iteration: 660000, test_RMSE: 1.1190418004989624, erank: 42.513011932
37305, s1: 0.004141408018767834, s5: 0.0027327907737344503
depth: 5, iteration: 662000, test_RMSE: 1.1190418004989624, erank: 42.501613616
94336, s1: 0.004146575927734375, s5: 0.0027336999773979187
depth: 5, iteration: 664000, test_RMSE: 1.1190416812896729, erank: 42.490192413
33008, s1: 0.004151780623942614, s5: 0.002734545385465026
depth: 5, iteration: 666000, test_RMSE: 1.1190418004989624, erank: 42.478836059
57031, s1: 0.0041569811291992664, s5: 0.002735431306064129
depth: 5, iteration: 668000, test_RMSE: 1.1190418004989624, erank: 42.467285156
25, s1: 0.004162302706390619, s5: 0.002736310474574566
depth: 5, iteration: 670000, test_RMSE: 1.1190418004989624, erank: 42.455802917

48047, s1: 0.004167534876614809, s5: 0.0027371689211577177
depth: 5, iteration: 672000, test_RMSE: 1.1190418004989624, erank: 42.444164276
12305, s1: 0.0041728876531124115, s5: 0.002738070907071233
depth: 5, iteration: 674000, test_RMSE: 1.1190418004989624, erank: 42.432556152
34375, s1: 0.0041781943291425705, s5: 0.0027389575261622667
depth: 5, iteration: 676000, test_RMSE: 1.1190418004989624, erank: 42.420936584
472656, s1: 0.004183600656688213, s5: 0.002739852759987116
depth: 5, iteration: 678000, test_RMSE: 1.1190418004989624, erank: 42.409183502
197266, s1: 0.004189022816717625, s5: 0.0027407826855778694
depth: 5, iteration: 680000, test_RMSE: 1.1190418004989624, erank: 42.397468566
89453, s1: 0.004194463137537241, s5: 0.0027416942175477743
depth: 5, iteration: 682000, test_RMSE: 1.1190418004989624, erank: 42.385654449
46289, s1: 0.004199912305921316, s5: 0.0027426162268966436
depth: 5, iteration: 684000, test_RMSE: 1.1190418004989624, erank: 42.373844146
728516, s1: 0.004205412697046995, s5: 0.0027435636147856712
depth: 5, iteration: 686000, test_RMSE: 1.1190418004989624, erank: 42.361976623
535156, s1: 0.004210928920656443, s5: 0.00274445116519928
depth: 5, iteration: 688000, test_RMSE: 1.1190418004989624, erank: 42.350078582
76367, s1: 0.004216459114104509, s5: 0.002745432546362281
depth: 5, iteration: 690000, test_RMSE: 1.1190418004989624, erank: 42.338146209
7168, s1: 0.004222018178552389, s5: 0.002746359445154667
depth: 5, iteration: 692000, test_RMSE: 1.1190418004989624, erank: 42.326164245
60547, s1: 0.004227598663419485, s5: 0.0027473249938338995
depth: 5, iteration: 694000, test_RMSE: 1.1190418004989624, erank: 42.314117431
640625, s1: 0.0042332434095442295, s5: 0.0027482849545776844
depth: 5, iteration: 696000, test_RMSE: 1.1190418004989624, erank: 42.302021026
61133, s1: 0.0042389314621686935, s5: 0.0027492796070873737
depth: 5, iteration: 698000, test_RMSE: 1.1190418004989624, erank: 42.289878845
214844, s1: 0.004244635347276926, s5: 0.0027502556331455708
depth: 5, iteration: 700000, test_RMSE: 1.1190416812896729, erank: 42.277763366
69922, s1: 0.004250326193869114, s5: 0.0027512265369296074
depth: 5, iteration: 702000, test_RMSE: 1.1190416812896729, erank: 42.265609741
21094, s1: 0.004256059415638447, s5: 0.0027521944139152765
depth: 5, iteration: 704000, test_RMSE: 1.1190418004989624, erank: 42.253326416
015625, s1: 0.004261826165020466, s5: 0.002753197681158781
depth: 5, iteration: 706000, test_RMSE: 1.1190418004989624, erank: 42.241039276
12305, s1: 0.004267618525773287, s5: 0.002754208631813526
depth: 5, iteration: 708000, test_RMSE: 1.1190418004989624, erank: 42.228702545
166016, s1: 0.0042734588496387005, s5: 0.0027552058454602957
depth: 5, iteration: 710000, test_RMSE: 1.1190416812896729, erank: 42.216312408
447266, s1: 0.004279330838471651, s5: 0.0027562505565583706
depth: 5, iteration: 712000, test_RMSE: 1.1190416812896729, erank: 42.203895568
847656, s1: 0.004285206086933613, s5: 0.0027572941035032272
depth: 5, iteration: 714000, test_RMSE: 1.1190416812896729, erank: 42.191429138
183594, s1: 0.004291146527975798, s5: 0.002758342307060957
depth: 5, iteration: 716000, test_RMSE: 1.1190416812896729, erank: 42.178897857
666016, s1: 0.004297087900340557, s5: 0.0027593858540058136
depth: 5, iteration: 718000, test_RMSE: 1.1190416812896729, erank: 42.166328430
17578, s1: 0.0043030851520597935, s5: 0.0027604529168456793
depth: 5, iteration: 720000, test_RMSE: 1.1190416812896729, erank: 42.153671264
64844, s1: 0.00430914293974638, s5: 0.0027615490835160017
depth: 5, iteration: 722000, test_RMSE: 1.1190416812896729, erank: 42.141109466
552734, s1: 0.00431514997035265, s5: 0.0027626119554042816
depth: 5, iteration: 724000, test_RMSE: 1.1190416812896729, erank: 42.128402709

96094, s1: 0.004321232903748751, s5: 0.0027636743616312742
depth: 5, iteration: 726000, test_RMSE: 1.1190416812896729, erank: 42.115650177
00195, s1: 0.004327366128563881, s5: 0.002764821285381913
depth: 5, iteration: 728000, test_RMSE: 1.1190416812896729, erank: 42.102817535
40039, s1: 0.004333546385169029, s5: 0.0027659095358103514
depth: 5, iteration: 730000, test_RMSE: 1.1190416812896729, erank: 42.090003967
285156, s1: 0.004339722916483879, s5: 0.0027670494746416807
depth: 5, iteration: 732000, test_RMSE: 1.1190416812896729, erank: 42.077129364
01367, s1: 0.004345927853137255, s5: 0.0027681870851665735
depth: 5, iteration: 734000, test_RMSE: 1.1190416812896729, erank: 42.064159393
31055, s1: 0.004352184943854809, s5: 0.0027693321462720633
depth: 5, iteration: 736000, test_RMSE: 1.1190416812896729, erank: 42.051174163
81836, s1: 0.004358488135039806, s5: 0.0027705186512321234
depth: 5, iteration: 738000, test_RMSE: 1.1190416812896729, erank: 42.038192749
02344, s1: 0.004364776890724897, s5: 0.0027716641779989004
depth: 5, iteration: 740000, test_RMSE: 1.1190416812896729, erank: 42.025085449
21875, s1: 0.004371143411844969, s5: 0.0027728420682251453
depth: 5, iteration: 742000, test_RMSE: 1.1190416812896729, erank: 42.012001037
597656, s1: 0.004377468954771757, s5: 0.002774051856249571
depth: 5, iteration: 744000, test_RMSE: 1.1190416812896729, erank: 41.998889923
0957, s1: 0.004383874591439962, s5: 0.0027752495370805264
depth: 5, iteration: 746000, test_RMSE: 1.1190416812896729, erank: 41.985626220
703125, s1: 0.004390296526253223, s5: 0.0027764674741774797
depth: 5, iteration: 748000, test_RMSE: 1.1190416812896729, erank: 41.972404479
98047, s1: 0.004396743606775999, s5: 0.002777694957330823
depth: 5, iteration: 750000, test_RMSE: 1.1190416812896729, erank: 41.959106445
3125, s1: 0.00440321397036314, s5: 0.0027789536397904158
depth: 5, iteration: 752000, test_RMSE: 1.1190416812896729, erank: 41.945755004
88281, s1: 0.0044097681529819965, s5: 0.0027802216354757547
depth: 5, iteration: 754000, test_RMSE: 1.1190416812896729, erank: 41.932373046
875, s1: 0.004416279029101133, s5: 0.0027815154753625393
depth: 5, iteration: 756000, test_RMSE: 1.1190416812896729, erank: 41.918930053
71094, s1: 0.004422890488058329, s5: 0.0027827906887978315
depth: 5, iteration: 758000, test_RMSE: 1.1190416812896729, erank: 41.905483245
84961, s1: 0.004429493099451065, s5: 0.0027840903494507074
depth: 5, iteration: 760000, test_RMSE: 1.1190416812896729, erank: 41.891925811
76758, s1: 0.00443617207929492, s5: 0.0027854167856276035
depth: 5, iteration: 762000, test_RMSE: 1.1190416812896729, erank: 41.878322601
31836, s1: 0.004442831501364708, s5: 0.0027867599856108427
depth: 5, iteration: 764000, test_RMSE: 1.1190416812896729, erank: 41.864727020
26367, s1: 0.004449528641998768, s5: 0.0027881055139005184
depth: 5, iteration: 766000, test_RMSE: 1.1190416812896729, erank: 41.851036071
777344, s1: 0.004456282593309879, s5: 0.002789455931633711
depth: 5, iteration: 768000, test_RMSE: 1.1190416812896729, erank: 41.837326049
80469, s1: 0.0044630663469433784, s5: 0.002790839411318302
depth: 5, iteration: 770000, test_RMSE: 1.1190416812896729, erank: 41.823554992
67578, s1: 0.004469892475754023, s5: 0.0027922054287046194
depth: 5, iteration: 772000, test_RMSE: 1.1190416812896729, erank: 41.809745788
57422, s1: 0.004476731177419424, s5: 0.002793621737509966
depth: 5, iteration: 774000, test_RMSE: 1.1190416812896729, erank: 41.795886993
4082, s1: 0.004483617842197418, s5: 0.0027950468938797712
depth: 5, iteration: 776000, test_RMSE: 1.1190416812896729, erank: 41.781967163
08594, s1: 0.00449054641649127, s5: 0.0027964806649833918
depth: 5, iteration: 778000, test_RMSE: 1.1190416812896729, erank: 41.768001556

396484, s1: 0.0044975075870752335, s5: 0.0027979116421192884
depth: 5, iteration: 780000, test_RMSE: 1.1190416812896729, erank: 41.754005432
128906, s1: 0.004504503682255745, s5: 0.0027993740513920784
depth: 5, iteration: 782000, test_RMSE: 1.1190416812896729, erank: 41.739948272
70508, s1: 0.004511547274887562, s5: 0.0028009002562612295
depth: 5, iteration: 784000, test_RMSE: 1.1190416812896729, erank: 41.725898742
67578, s1: 0.004518596455454826, s5: 0.0028023417107760906
depth: 5, iteration: 786000, test_RMSE: 1.1190416812896729, erank: 41.711734771
728516, s1: 0.004525693599134684, s5: 0.002803869778290391
depth: 5, iteration: 788000, test_RMSE: 1.1190416812896729, erank: 41.697536468
50586, s1: 0.004532805643975735, s5: 0.0028053796850144863
depth: 5, iteration: 790000, test_RMSE: 1.1190416812896729, erank: 41.683300018
31055, s1: 0.004539979621767998, s5: 0.0028069287072867155
depth: 5, iteration: 792000, test_RMSE: 1.1190416812896729, erank: 41.669013977
05078, s1: 0.004547156859189272, s5: 0.0028084898367524147
depth: 5, iteration: 794000, test_RMSE: 1.1190416812896729, erank: 41.654689788
81836, s1: 0.004554404877126217, s5: 0.0028100814670324326
depth: 5, iteration: 796000, test_RMSE: 1.1190416812896729, erank: 41.640285491
94336, s1: 0.0045617083087563515, s5: 0.0028116502799093723
depth: 5, iteration: 798000, test_RMSE: 1.1190416812896729, erank: 41.625850677
490234, s1: 0.004569032229483128, s5: 0.0028132700826972723

RUN: python /content/content/synth/main.py --method DLNN --data gaussian --N 10
0 --rank 5 --reg_norm ratio --initscale 1e-3 --sample_size 4000 --log_interval
2000 --depth 5 --lam 0.0 --optim Adam --lr 1e-3 --niters 30000
depth: 5, iteration: 0, test_RMSE: 1.1277276277542114, erank: 43.0359306335449
2, s1: 0.003391407895833254, s5: 0.002699912991374731
depth: 5, iteration: 2000, test_RMSE: 1.3615732192993164, erank: 4.957746982574
463, s1: 54.980186462402344, s5: 33.250892639160156
depth: 5, iteration: 4000, test_RMSE: 1.3616067171096802, erank: 4.954370498657
227, s1: 54.9815673828125, s5: 33.25388717651367
depth: 5, iteration: 6000, test_RMSE: 1.361436128616333, erank: 4.9512362480163
57, s1: 54.91874694824219, s5: 33.254764556884766
depth: 5, iteration: 8000, test_RMSE: 1.3632899522781372, erank: 4.946258068084
717, s1: 55.43133544921875, s5: 33.26249694824219
depth: 5, iteration: 10000, test_RMSE: 1.3617908954620361, erank: 4.94684505462
6465, s1: 55.0001220703125, s5: 33.26166534423828
depth: 5, iteration: 12000, test_RMSE: 1.3616728782653809, erank: 4.94585514068
6035, s1: 55.03804016113281, s5: 33.25127029418945
depth: 5, iteration: 14000, test_RMSE: 1.3610843420028687, erank: 4.94569730758
667, s1: 54.8225212097168, s5: 33.25967025756836
depth: 5, iteration: 16000, test_RMSE: 1.3615187406539917, erank: 4.94417953491
2109, s1: 54.93376922607422, s5: 33.258731842041016
depth: 5, iteration: 18000, test_RMSE: 1.36151123046875, erank: 4.9434418678283
69, s1: 54.94428253173828, s5: 33.26239776611328
depth: 5, iteration: 20000, test_RMSE: 1.3619416952133179, erank: 4.94231271743
7744, s1: 55.15922927856445, s5: 33.254180908203125
depth: 5, iteration: 22000, test_RMSE: 1.3626022338867188, erank: 4.94067573547
3633, s1: 55.4019775390625, s5: 33.25346374511719
depth: 5, iteration: 24000, test_RMSE: 1.3623000383377075, erank: 4.94069862365
7227, s1: 55.190162658691406, s5: 33.264129638671875
depth: 5, iteration: 26000, test_RMSE: 1.3617221117019653, erank: 4.94111537933
3496, s1: 54.98933410644531, s5: 33.26459884643555
depth: 5, iteration: 28000, test_RMSE: 1.3621761798858643, erank: 4.94002819061

2793, s1: 55.21480178833008, s5: 33.26804733276367

In [9]:
```python
for opt, lr, steps in (("Adam", LR_ADAM, LONG_ITERS_ADAM), ("GD", LR_GD, LONG_
    run_and_log(f"F2_{opt.lower()}_d3_lam1e-4",
        **BASE_SYN, depth=3, lam="1e-4", optim=opt, lr=lr, niters=steps)
```

RUN: python /content/content/synth/main.py --method DLNN --data gaussian --N 10
0 --rank 5 --reg_norm ratio --initscale 1e-3 --sample_size 4000 --log_interval
2000 --depth 3 --lam 1e-4 --optim Adam --lr 1e-3 --niters 30000
depth: 3, iteration: 0, test_RMSE: 1.130967140197754, erank: 57.43481063842773
4, s1: 0.002728724619373679, s5: 0.002215920016169548
depth: 3, iteration: 2000, test_RMSE: 1.3698301315307617, erank: 5.165743827819
824, s1: 52.67234802246094, s5: 35.7275390625
depth: 3, iteration: 4000, test_RMSE: 1.3699700832366943, erank: 5.087910652160
6445, s1: 52.66286087036133, s5: 35.75092315673828
depth: 3, iteration: 6000, test_RMSE: 1.3700666427612305, erank: 5.024189472198
486, s1: 52.658409118652344, s5: 35.766456604003906
depth: 3, iteration: 8000, test_RMSE: 1.3698979616165161, erank: 4.975847244262
695, s1: 52.60279083251953, s5: 35.78527069091797
depth: 3, iteration: 10000, test_RMSE: 1.3700504302978516, erank: 4.96147823333
7402, s1: 52.660823822021484, s5: 35.787109375
depth: 3, iteration: 12000, test_RMSE: 1.3699673414230347, erank: 4.95750141143
7988, s1: 52.59660720825195, s5: 35.77778244018555
depth: 3, iteration: 14000, test_RMSE: 1.3702518939971924, erank: 4.95539522171
0205, s1: 52.680049896240234, s5: 35.776161193847656
depth: 3, iteration: 16000, test_RMSE: 1.3700445890426636, erank: 4.95470952987
6709, s1: 52.62519454956055, s5: 35.780242919921875
depth: 3, iteration: 18000, test_RMSE: 1.3706032037734985, erank: 4.95371818542
4805, s1: 52.74528503417969, s5: 35.779197692871094
depth: 3, iteration: 20000, test_RMSE: 1.3703399896621704, erank: 4.95370817184
4482, s1: 52.661720275878906, s5: 35.781646728515625
depth: 3, iteration: 22000, test_RMSE: 1.3699939250946045, erank: 4.95366907119
751, s1: 52.628265380859375, s5: 35.776771545410156
depth: 3, iteration: 24000, test_RMSE: 1.3705860376358032, erank: 4.95293760299
6826, s1: 52.81112289428711, s5: 35.78339385986328
depth: 3, iteration: 26000, test_RMSE: 1.370229721069336, erank: 4.953372955322
266, s1: 52.652042388916016, s5: 35.77803421020508
depth: 3, iteration: 28000, test_RMSE: 1.3702884912490845, erank: 4.95299100875
8545, s1: 52.75730895996094, s5: 35.78458786010742

RUN: python /content/content/synth/main.py --method DLNN --data gaussian --N 10
0 --rank 5 --reg_norm ratio --initscale 1e-3 --sample_size 4000 --log_interval
2000 --depth 3 --lam 1e-4 --optim GD --lr 1e-3 --niters 800000
depth: 3, iteration: 0, test_RMSE: 1.123811960220337, erank: 57.06502151489258,
s1: 0.0028843253385275602, s5: 0.0023306577932089567
depth: 3, iteration: 2000, test_RMSE: 1.123811960220337, erank: 56.867626190185
55, s1: 0.0029159048572182655, s5: 0.002346235094591975
depth: 3, iteration: 4000, test_RMSE: 1.123811960220337, erank: 56.669017791748
05, s1: 0.0029481269884854555, s5: 0.0023619537241756916
depth: 3, iteration: 6000, test_RMSE: 1.123811960220337, erank: 56.469058990478
516, s1: 0.002981087425723672, s5: 0.0023778739850968122
depth: 3, iteration: 8000, test_RMSE: 1.123811960220337, erank: 56.267951965332
03, s1: 0.0030147088691592216, s5: 0.002393896458670497
depth: 3, iteration: 10000, test_RMSE: 1.123811960220337, erank: 56.06547927856
445, s1: 0.003049146384000778, s5: 0.0024100840091705322
depth: 3, iteration: 12000, test_RMSE: 1.123811960220337, erank: 55.86176300048
828, s1: 0.003084275173023343, s5: 0.002426423830911517
depth: 3, iteration: 14000, test_RMSE: 1.123811960220337, erank: 55.65679550170
8984, s1: 0.003120200941339135, s5: 0.0024428858887404203
depth: 3, iteration: 16000, test_RMSE: 1.1238120794296265, erank: 55.4505691528

3203, s1: 0.0031568703707307577, s5: 0.002459508366882801
depth: 3, iteration: 18000, test_RMSE: 1.1238120794296265, erank: 55.2431068420
41016, s1: 0.0031943523790687323, s5: 0.0024762540124356747
depth: 3, iteration: 20000, test_RMSE: 1.1238120794296265, erank: 55.0343437194
8242, s1: 0.003232634160667658, s5: 0.002493133768439293
depth: 3, iteration: 22000, test_RMSE: 1.1238120794296265, erank: 54.8242797851
5625, s1: 0.003271787893027067, s5: 0.002510164165869355
depth: 3, iteration: 24000, test_RMSE: 1.1238120794296265, erank: 54.6130142211
91406, s1: 0.0033117630518972874, s5: 0.002527299802750349
depth: 3, iteration: 26000, test_RMSE: 1.123812198638916, erank: 54.40042495727
539, s1: 0.0033526059705764055, s5: 0.0025445849169045687
depth: 3, iteration: 28000, test_RMSE: 1.123812198638916, erank: 54.18661880493
164, s1: 0.0033944081515073776, s5: 0.0025619668886065483
depth: 3, iteration: 30000, test_RMSE: 1.123812198638916, erank: 53.97153091430
664, s1: 0.0034370904322713614, s5: 0.002579447580501437
depth: 3, iteration: 32000, test_RMSE: 1.123812198638916, erank: 53.75527191162
1094, s1: 0.0034807161428034306, s5: 0.0025970640126615763
depth: 3, iteration: 34000, test_RMSE: 1.123812198638916, erank: 53.53792572021
4844, s1: 0.003525317879393697, s5: 0.0026147833559662104
depth: 3, iteration: 36000, test_RMSE: 1.123812198638916, erank: 53.31944656372
07, s1: 0.0035708495415747166, s5: 0.002632569056004286
depth: 3, iteration: 38000, test_RMSE: 1.123812198638916, erank: 53.09966278076
172, s1: 0.0036174363922327757, s5: 0.0026504364795982838
depth: 3, iteration: 40000, test_RMSE: 1.123812198638916, erank: 52.87861251831
055, s1: 0.003665116848424077, s5: 0.0026683525647968054
depth: 3, iteration: 42000, test_RMSE: 1.1238123178482056, erank: 52.6563873291
0156, s1: 0.0037138049956411123, s5: 0.0026864269748330116
depth: 3, iteration: 44000, test_RMSE: 1.1238123178482056, erank: 52.4330101013
1836, s1: 0.0037635439075529575, s5: 0.0027044930029660463
depth: 3, iteration: 46000, test_RMSE: 1.1238123178482056, erank: 52.2084617614
7461, s1: 0.0038144465070217848, s5: 0.0027226766105741262
depth: 3, iteration: 48000, test_RMSE: 1.1238123178482056, erank: 51.9827308654
78516, s1: 0.0038664499297738075, s5: 0.0027408874593675137
depth: 3, iteration: 50000, test_RMSE: 1.1238123178482056, erank: 51.7558174133
3008, s1: 0.003919675946235657, s5: 0.0027592016849666834
depth: 3, iteration: 52000, test_RMSE: 1.1238123178482056, erank: 51.5278129577
6367, s1: 0.003974033985286951, s5: 0.002777501940727234
depth: 3, iteration: 54000, test_RMSE: 1.1238123178482056, erank: 51.2985076904
2969, s1: 0.004029696341603994, s5: 0.0027958338614553213
depth: 3, iteration: 56000, test_RMSE: 1.1238124370574951, erank: 51.0680885314
9414, s1: 0.004086596425622702, s5: 0.002814202569425106
depth: 3, iteration: 58000, test_RMSE: 1.1238124370574951, erank: 50.8364181518
5547, s1: 0.004144811537116766, s5: 0.002832630882039666
depth: 3, iteration: 60000, test_RMSE: 1.1238124370574951, erank: 50.6035728454
58984, s1: 0.004204422701150179, s5: 0.0028510636184364557
depth: 3, iteration: 62000, test_RMSE: 1.1238124370574951, erank: 50.3695678710
9375, s1: 0.004265457391738892, s5: 0.0028694893699139357
depth: 3, iteration: 64000, test_RMSE: 1.1238124370574951, erank: 50.1346015930
1758, s1: 0.00432785181328 6543, s5: 0.0028879025485366583
depth: 3, iteration: 66000, test_RMSE: 1.1238125562667847, erank: 49.8983955383
3008, s1: 0.004391704685986042, s5: 0.0029063280671834946
depth: 3, iteration: 68000, test_RMSE: 1.1238125562667847, erank: 49.6611251831
0547, s1: 0.004457039292901754, s5: 0.0029247284401208162
depth: 3, iteration: 70000, test_RMSE: 1.1238125562667847, erank: 49.4228363037

1094, s1: 0.004523859824985266, s5: 0.0029431628063321114
depth: 3, iteration: 72000, test_RMSE: 1.1238125562667847, erank: 49.1835060119
6289, s1: 0.004592241253703833, s5: 0.002961535705253482
depth: 3, iteration: 74000, test_RMSE: 1.1238125562667847, erank: 48.9430999755
8594, s1: 0.004662251565605402, s5: 0.0029799046460539103
depth: 3, iteration: 76000, test_RMSE: 1.1238125562667847, erank: 48.7016601562
5, s1: 0.004733890760689974, s5: 0.0029981706757098436
depth: 3, iteration: 78000, test_RMSE: 1.1238125562667847, erank: 48.4590301513
6719, s1: 0.004807219840586185, s5: 0.003016409929841757
depth: 3, iteration: 80000, test_RMSE: 1.1238126754760742, erank: 48.2155647277
832, s1: 0.004882258828729391, s5: 0.0030345406848937273
depth: 3, iteration: 82000, test_RMSE: 1.1238126754760742, erank: 47.9709777832
03125, s1: 0.004959098529070616, s5: 0.003052610671147704
depth: 3, iteration: 84000, test_RMSE: 1.1238126754760742, erank: 47.7254676818
84766, s1: 0.005037727300077677, s5: 0.003070579841732979
depth: 3, iteration: 86000, test_RMSE: 1.1238127946853638, erank: 47.4789276123
0469, s1: 0.005118315573781729, s5: 0.003088423516601324
depth: 3, iteration: 88000, test_RMSE: 1.1238127946853638, erank: 47.2315216064
4531, s1: 0.00520081352442503, s5: 0.003106111427769065
depth: 3, iteration: 90000, test_RMSE: 1.1238127946853638, erank: 46.9830207824
707, s1: 0.005285287741571665, s5: 0.0031237376388162374
depth: 3, iteration: 92000, test_RMSE: 1.1238127946853638, erank: 46.7335739135
7422, s1: 0.0053717694245278835, s5: 0.0031411652453243732
depth: 3, iteration: 94000, test_RMSE: 1.1238127946853638, erank: 46.4830245971
6797, s1: 0.005460455548018217, s5: 0.0031584822572767735
depth: 3, iteration: 96000, test_RMSE: 1.1238127946853638, erank: 46.2313652038
5742, s1: 0.005551300942897797, s5: 0.0031755922827869654
depth: 3, iteration: 98000, test_RMSE: 1.1238127946853638, erank: 45.9786758422
85156, s1: 0.0056442925706505775, s5: 0.0031925803050398827
depth: 3, iteration: 100000, test_RMSE: 1.1238129138946533, erank: 45.724815368
652344, s1: 0.0057396236807107925, s5: 0.0032094335183501244
depth: 3, iteration: 102000, test_RMSE: 1.1238129138946533, erank: 45.470130920
410156, s1: 0.005837240722030401, s5: 0.003226066241040826
depth: 3, iteration: 104000, test_RMSE: 1.1238129138946533, erank: 45.214324951
171875, s1: 0.005937193054705858, s5: 0.0032425459939986467
depth: 3, iteration: 106000, test_RMSE: 1.1238129138946533, erank: 44.957527160
64453, s1: 0.006039561703801155, s5: 0.0032588294707238674
depth: 3, iteration: 108000, test_RMSE: 1.1238129138946533, erank: 44.699829101
5625, s1: 0.006144389044493437, s5: 0.0032748922239989042
depth: 3, iteration: 110000, test_RMSE: 1.1238130331039429, erank: 44.441062927
246094, s1: 0.006251859944313765, s5: 0.0032907016575336456
depth: 3, iteration: 112000, test_RMSE: 1.1238130331039429, erank: 44.181190490
722656, s1: 0.006362014915794134, s5: 0.003306283615529537
depth: 3, iteration: 114000, test_RMSE: 1.1238130331039429, erank: 43.920379638
671875, s1: 0.006474899593740702, s5: 0.003321629948914051
depth: 3, iteration: 116000, test_RMSE: 1.1238130331039429, erank: 43.658363342
285156, s1: 0.006590600591152906, s5: 0.0033367439173161983
depth: 3, iteration: 118000, test_RMSE: 1.1238131523132324, erank: 43.395538330
078125, s1: 0.006709060166031122, s5: 0.0033515579998493195
depth: 3, iteration: 120000, test_RMSE: 1.1238131523132324, erank: 43.131668090
82031, s1: 0.006830420810729265, s5: 0.0033661234192550182
depth: 3, iteration: 122000, test_RMSE: 1.1238131523132324, erank: 42.866718292
23633, s1: 0.0069547854363918304, s5: 0.0033804073464125395
depth: 3, iteration: 124000, test_RMSE: 1.1238131523132324, erank: 42.600818634

0332, s1: 0.007082115858793259, s5: 0.003394400468096137
depth: 3, iteration: 126000, test_RMSE: 1.1238131523132324, erank: 42.333824157
714844, s1: 0.0072126928716897964, s5: 0.003408134216442704
depth: 3, iteration: 128000, test_RMSE: 1.123813271522522, erank: 42.0659370422
3633, s1: 0.007346358150243759, s5: 0.003421478671953082
depth: 3, iteration: 130000, test_RMSE: 1.123813271522522, erank: 41.7970275878
90625, s1: 0.00748326675966382, s5: 0.0034345209132879972
depth: 3, iteration: 132000, test_RMSE: 1.123813271522522, erank: 41.5270690917
96875, s1: 0.007623615674674511, s5: 0.0034473200794309378
depth: 3, iteration: 134000, test_RMSE: 1.123813271522522, erank: 41.2561035156
25, s1: 0.007767290808260441, s5: 0.0034597120247781277
depth: 3, iteration: 136000, test_RMSE: 1.123813271522522, erank: 40.9840888977
0508, s1: 0.007914417423307896, s5: 0.003471874399110675
depth: 3, iteration: 138000, test_RMSE: 1.1238133907318115, erank: 40.711166381
83594, s1: 0.008065057918429375, s5: 0.003483651438727975
depth: 3, iteration: 140000, test_RMSE: 1.1238133907318115, erank: 40.437114715
57617, s1: 0.008219413459300995, s5: 0.0034951285924762487
depth: 3, iteration: 142000, test_RMSE: 1.1238133907318115, erank: 40.162261962
890625, s1: 0.008377180434763432, s5: 0.003506219247356057
depth: 3, iteration: 144000, test_RMSE: 1.123813509941101, erank: 39.8863143920
89844, s1: 0.008538726717233658, s5: 0.0035169795155525208
depth: 3, iteration: 146000, test_RMSE: 1.123813509941101, erank: 39.6093139648
4375, s1: 0.008704137988388538, s5: 0.0035274310503154993
depth: 3, iteration: 148000, test_RMSE: 1.123813509941101, erank: 39.3313980102
53906, s1: 0.008873272687196732, s5: 0.0035375352017581463
depth: 3, iteration: 150000, test_RMSE: 1.123813509941101, erank: 39.0525016784
668, s1: 0.009046348743140697, s5: 0.003547277534380555
depth: 3, iteration: 152000, test_RMSE: 1.1238136291503906, erank: 38.772655487
06055, s1: 0.009223364293575287, s5: 0.003556643845513463
depth: 3, iteration: 154000, test_RMSE: 1.1238136291503906, erank: 38.491909027
09961, s1: 0.009404274635016918, s5: 0.003565690014511347
depth: 3, iteration: 156000, test_RMSE: 1.1238136291503906, erank: 38.210453033
447266, s1: 0.009589128196239471, s5: 0.0035743608605116606
depth: 3, iteration: 158000, test_RMSE: 1.1238136291503906, erank: 37.927986145
01953, s1: 0.009778117761015892, s5: 0.003582712495699525
depth: 3, iteration: 160000, test_RMSE: 1.1238137483596802, erank: 37.644889831
54297, s1: 0.009971071034669876, s5: 0.0035906920675188303
depth: 3, iteration: 162000, test_RMSE: 1.1238137483596802, erank: 37.360839843
75, s1: 0.010168233886361122, s5: 0.003598287235945463
depth: 3, iteration: 164000, test_RMSE: 1.1238137483596802, erank: 37.076080322
265625, s1: 0.010369491763412952, s5: 0.0036055417731404305
depth: 3, iteration: 166000, test_RMSE: 1.1238137483596802, erank: 36.790561676
02539, s1: 0.010574948973953724, s5: 0.003612420754507184
depth: 3, iteration: 168000, test_RMSE: 1.1238137483596802, erank: 36.504444122
31445, s1: 0.010784506797790527, s5: 0.0036189425736665726
depth: 3, iteration: 170000, test_RMSE: 1.1238137483596802, erank: 36.217662811
2793, s1: 0.010998271405696869, s5: 0.0036250889768320322
depth: 3, iteration: 172000, test_RMSE: 1.1238137483596802, erank: 35.930255889
89258, s1: 0.011216269806027412, s5: 0.003630983177572489
depth: 3, iteration: 174000, test_RMSE: 1.1238138675689697, erank: 35.642433166
503906, s1: 0.011438342742621899, s5: 0.003636519657447934
depth: 3, iteration: 176000, test_RMSE: 1.1238138675689697, erank: 35.354164123
535156, s1: 0.011664611287415028, s5: 0.003641655668616295
depth: 3, iteration: 178000, test_RMSE: 1.1238139867782593, erank: 35.065433502

197266, s1: 0.011895105242729187, s5: 0.0036465642042458057
depth: 3, iteration: 180000, test_RMSE: 1.1238139867782593, erank: 34.776466369
628906, s1: 0.012129467725952625, s5: 0.0036510927602648735
depth: 3, iteration: 182000, test_RMSE: 1.1238139867782593, erank: 34.487136840
82031, s1: 0.012368420138955116, s5: 0.0036553549580276012
depth: 3, iteration: 184000, test_RMSE: 1.1238141059875488, erank: 34.197853088
378906, s1: 0.012611187994480133, s5: 0.0036592716351151466
depth: 3, iteration: 186000, test_RMSE: 1.1238141059875488, erank: 33.908359527
58789, s1: 0.012858062982559204, s5: 0.003662888891994953
depth: 3, iteration: 188000, test_RMSE: 1.1238141059875488, erank: 33.619033813
47656, s1: 0.013108806684613228, s5: 0.003666271222755313
depth: 3, iteration: 190000, test_RMSE: 1.1238141059875488, erank: 33.329727172
85156, s1: 0.013363536447286606, s5: 0.0036693753208965063
depth: 3, iteration: 192000, test_RMSE: 1.1238142251968384, erank: 33.040580749
51172, s1: 0.013622230850160122, s5: 0.003672224935144186
depth: 3, iteration: 194000, test_RMSE: 1.1238142251968384, erank: 32.751846313
47656, s1: 0.01388460025191307, s5: 0.0036748303100466673
depth: 3, iteration: 196000, test_RMSE: 1.1238142251968384, erank: 32.463516235
35156, s1: 0.014150735922157764, s5: 0.0036771635059267282
depth: 3, iteration: 198000, test_RMSE: 1.1238142251968384, erank: 32.175651550
29297, s1: 0.014420467428863049, s5: 0.0036793514154851437
depth: 3, iteration: 200000, test_RMSE: 1.1238142251968384, erank: 31.888357162
475586, s1: 0.014693996869027615, s5: 0.0036812543403357267
depth: 3, iteration: 202000, test_RMSE: 1.123814344406128, erank: 31.6017951965
33203, s1: 0.014970963820815086, s5: 0.003682955401018262
depth: 3, iteration: 204000, test_RMSE: 1.123814344406128, erank: 31.3159141540
52734, s1: 0.01525152288377285, s5: 0.0036844501737505198
depth: 3, iteration: 206000, test_RMSE: 1.123814344406128, erank: 31.0310420989
99023, s1: 0.015535388141870499, s5: 0.003685767063871026
depth: 3, iteration: 208000, test_RMSE: 1.123814344406128, erank: 30.7471332550
04883, s1: 0.015822596848011017, s5: 0.00368693470954895
depth: 3, iteration: 210000, test_RMSE: 1.123814344406128, erank: 30.4643840789
79492, s1: 0.01611296646296978, s5: 0.003687953809276223
depth: 3, iteration: 212000, test_RMSE: 1.1238144636154175, erank: 30.182601928
710938, s1: 0.016406793147325516, s5: 0.0036888262256979942
depth: 3, iteration: 214000, test_RMSE: 1.1238144636154175, erank: 29.902170181
274414, s1: 0.016703497618436813, s5: 0.003689568256959319
depth: 3, iteration: 216000, test_RMSE: 1.1238144636154175, erank: 29.622932434
08203, s1: 0.017003417015075684, s5: 0.0036902003921568394
depth: 3, iteration: 218000, test_RMSE: 1.1238144636154175, erank: 29.345430374
145508, s1: 0.01730583980679512, s5: 0.003690709825605154
depth: 3, iteration: 220000, test_RMSE: 1.1238144636154175, erank: 29.069034576
416016, s1: 0.017611678689718246, s5: 0.00369109190069139
depth: 3, iteration: 222000, test_RMSE: 1.123814582824707, erank: 28.7942333221
43555, s1: 0.017920317128300667, s5: 0.0036914111115038395
depth: 3, iteration: 224000, test_RMSE: 1.123814582824707, erank: 28.5213356018
0664, s1: 0.018231254070997238, s5: 0.00369160040281713
depth: 3, iteration: 226000, test_RMSE: 1.123814582824707, erank: 28.2500686645
5078, s1: 0.018544895574450493, s5: 0.0036917394027113914
depth: 3, iteration: 228000, test_RMSE: 1.123814582824707, erank: 27.9804172515
86914, s1: 0.01886126399040222, s5: 0.0036918031983077526
depth: 3, iteration: 230000, test_RMSE: 1.123814582824707, erank: 27.7126235961
91406, s1: 0.019180096685886383, s5: 0.0036918397527188063
depth: 3, iteration: 232000, test_RMSE: 1.123814582824707, erank: 27.4468021392

82227, s1: 0.019501205533742905, s5: 0.0036918295081704855
depth: 3, iteration: 234000, test_RMSE: 1.1238147020339966, erank: 27.182981491
088867, s1: 0.019824577495455742, s5: 0.003691815072670579
depth: 3, iteration: 236000, test_RMSE: 1.1238147020339966, erank: 26.921003341
674805, s1: 0.020150447264313698, s5: 0.003691761288791895
depth: 3, iteration: 238000, test_RMSE: 1.1238147020339966, erank: 26.660997390
74707, s1: 0.0204786229878664, s5: 0.0036916963290423155
depth: 3, iteration: 240000, test_RMSE: 1.1238147020339966, erank: 26.403203964
2334, s1: 0.020808793604373932, s5: 0.0036916586104780436
depth: 3, iteration: 242000, test_RMSE: 1.1238147020339966, erank: 26.147371292
114258, s1: 0.02114131860435009, s5: 0.003691624151542783
depth: 3, iteration: 244000, test_RMSE: 1.1238147020339966, erank: 25.894115447
998047, s1: 0.02147529274225235, s5: 0.003691597143188119
depth: 3, iteration: 246000, test_RMSE: 1.1238147020339966, erank: 25.642467498
779297, s1: 0.021812260150909424, s5: 0.0036915780510753393
depth: 3, iteration: 248000, test_RMSE: 1.1238147020339966, erank: 25.393245697
021484, s1: 0.022150881588459015, s5: 0.0036916318349540234
depth: 3, iteration: 250000, test_RMSE: 1.1238147020339966, erank: 25.146095275
878906, s1: 0.022491756826639175, s5: 0.0036916974931955338
depth: 3, iteration: 252000, test_RMSE: 1.1238147020339966, erank: 24.901288986
206055, s1: 0.022834546864032745, s5: 0.003691831137984991
depth: 3, iteration: 254000, test_RMSE: 1.1238147020339966, erank: 24.658884048
461914, s1: 0.02317904122173786, s5: 0.0036919941194355488
depth: 3, iteration: 256000, test_RMSE: 1.1238147020339966, erank: 24.418745040
893555, s1: 0.023525504395365715, s5: 0.003692226018756628
depth: 3, iteration: 258000, test_RMSE: 1.1238147020339966, erank: 24.180774688
720703, s1: 0.02387411892414093, s5: 0.003692516591399908
depth: 3, iteration: 260000, test_RMSE: 1.1238147020339966, erank: 23.945262908
935547, s1: 0.024224406108260155, s5: 0.0036928951740264893
depth: 3, iteration: 262000, test_RMSE: 1.1238147020339966, erank: 23.712232589
72168, s1: 0.02457631379365921, s5: 0.0036933303344994783
depth: 3, iteration: 264000, test_RMSE: 1.1238147020339966, erank: 23.481325149
536133, s1: 0.02493034489452839, s5: 0.003693805541843176
depth: 3, iteration: 266000, test_RMSE: 1.1238147020339966, erank: 23.252737045
288086, s1: 0.0252863317728 0426, s5: 0.0036944763269275427
depth: 3, iteration: 268000, test_RMSE: 1.1238147020339966, erank: 23.026403427
124023, s1: 0.02564435824751854, s5: 0.0036952344235032797
depth: 3, iteration: 270000, test_RMSE: 1.1238147020339966, erank: 22.802511215
20996, s1: 0.026004033163189888, s5: 0.003695995546877384
depth: 3, iteration: 272000, test_RMSE: 1.1238147020339966, erank: 22.580945968
62793, s1: 0.026365619152784348, s5: 0.003696898464113474
depth: 3, iteration: 274000, test_RMSE: 1.1238147020339966, erank: 22.361783981
323242, s1: 0.026728812605142593, s5: 0.0036979259457439184
depth: 3, iteration: 276000, test_RMSE: 1.1238147020339966, erank: 22.144941329
956055, s1: 0.027093829587101936, s5: 0.0036989960353821516
depth: 3, iteration: 278000, test_RMSE: 1.123814582824707, erank: 21.9301986694
33594, s1: 0.027461126446723938, s5: 0.003700236091390252
depth: 3, iteration: 280000, test_RMSE: 1.123814582824707, erank: 21.7175655364
99023, s1: 0.0278306994587183, s5: 0.003701582318171859
depth: 3, iteration: 282000, test_RMSE: 1.123814582824707, erank: 21.5075283050
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depth: 3, iteration: 284000, test_RMSE: 1.123814582824707, erank: 21.2995853424
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depth: 3, iteration: 286000, test_RMSE: 1.123814582824707, erank: 21.0938587188

7207, s1: 0.02894974686205387, s5: 0.003706352086737752
depth: 3, iteration: 288000, test_RMSE: 1.1238144636154175, erank: 20.890344619
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depth: 3, iteration: 290000, test_RMSE: 1.1238144636154175, erank: 20.688968658
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depth: 3, iteration: 292000, test_RMSE: 1.1238144636154175, erank: 20.489919662
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depth: 3, iteration: 294000, test_RMSE: 1.123814344406128, erank: 20.2929878234
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depth: 3, iteration: 296000, test_RMSE: 1.123814344406128, erank: 20.0981369018
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depth: 3, iteration: 298000, test_RMSE: 1.1238142251968384, erank: 19.905534744
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depth: 3, iteration: 300000, test_RMSE: 1.1238142251968384, erank: 19.714759826
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depth: 3, iteration: 302000, test_RMSE: 1.1238142251968384, erank: 19.526107788
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depth: 3, iteration: 304000, test_RMSE: 1.1238142251968384, erank: 19.339540481
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depth: 3, iteration: 306000, test_RMSE: 1.1238141059875488, erank: 19.154853820
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depth: 3, iteration: 308000, test_RMSE: 1.1238141059875488, erank: 18.972249984
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depth: 3, iteration: 310000, test_RMSE: 1.1238139867782593, erank: 18.791509628
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depth: 3, iteration: 312000, test_RMSE: 1.1238139867782593, erank: 18.612712860
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depth: 3, iteration: 316000, test_RMSE: 1.1238137483596802, erank: 18.260553359
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depth: 3, iteration: 318000, test_RMSE: 1.1238137483596802, erank: 18.087463378
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depth: 3, iteration: 320000, test_RMSE: 1.1238137483596802, erank: 17.916055679
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depth: 3, iteration: 322000, test_RMSE: 1.1238136291503906, erank: 17.746143341
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depth: 3, iteration: 324000, test_RMSE: 1.123813509941101, erank: 17.5783481597
9004, s1: 0.036524876952171326, s5: 0.0037655809428542852
depth: 3, iteration: 326000, test_RMSE: 1.123813509941101, erank: 17.4118461608
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depth: 3, iteration: 328000, test_RMSE: 1.1238133907318115, erank: 17.247320175
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depth: 3, iteration: 330000, test_RMSE: 1.123813271522522, erank: 17.0843582153
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depth: 3, iteration: 332000, test_RMSE: 1.1238131523132324, erank: 16.922962188
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depth: 3, iteration: 334000, test_RMSE: 1.1238131523132324, erank: 16.763235092
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depth: 3, iteration: 336000, test_RMSE: 1.1238130331039429, erank: 16.605047225
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depth: 3, iteration: 338000, test_RMSE: 1.1238129138946533, erank: 16.448413848
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depth: 3, iteration: 340000, test_RMSE: 1.1238127946853638, erank: 16.293142318

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depth: 3, iteration: 384000, test_RMSE: 1.1238093376159668, erank: 13.204706192
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depth: 3, iteration: 412000, test_RMSE: 1.1238057613372803, erank: 11.491668701
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depth: 3, iteration: 514000, test_RMSE: 1.1237703561782837, erank: 6.2049984931
9458, s1: 0.126407653093338, s5: 0.004451500717550516
depth: 3, iteration: 516000, test_RMSE: 1.123768925666809, erank: 6.11315631866
4551, s1: 0.12878230214118958, s5: 0.004463000223040581
depth: 3, iteration: 518000, test_RMSE: 1.1237674951553345, erank: 6.0218725204
46777, s1: 0.13122974336147308, s5: 0.0044746664352715015
depth: 3, iteration: 520000, test_RMSE: 1.1237660646438599, erank: 5.9310216903
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depth: 3, iteration: 522000, test_RMSE: 1.1237645149230957, erank: 5.8406801223
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depth: 3, iteration: 524000, test_RMSE: 1.1237629652023315, erank: 5.7508192062
37793, s1: 0.13906095921993256, s5: 0.0045110611245036125
depth: 3, iteration: 526000, test_RMSE: 1.1237612962722778, erank: 5.6615810394
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depth: 3, iteration: 528000, test_RMSE: 1.1237596273422241, erank: 5.5727648735
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depth: 3, iteration: 530000, test_RMSE: 1.1237578392028809, erank: 5.4845933914
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depth: 3, iteration: 532000, test_RMSE: 1.123755931854248, erank: 5.39691066741
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depth: 3, iteration: 534000, test_RMSE: 1.1237540245056152, erank: 5.3097801208
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depth: 3, iteration: 536000, test_RMSE: 1.1237521171569824, erank: 5.2232751846
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depth: 3, iteration: 538000, test_RMSE: 1.12375009059906, erank: 5.137362957000
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depth: 3, iteration: 540000, test_RMSE: 1.1237479448318481, erank: 5.0520253181
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depth: 3, iteration: 552000, test_RMSE: 1.1237332820892334, erank: 4.5534310340
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depth: 3, iteration: 556000, test_RMSE: 1.1237276792526245, erank: 4.3926324844

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depth: 3, iteration: 558000, test_RMSE: 1.1237245798110962, erank: 4.3132600784
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depth: 3, iteration: 722000, test_RMSE: 1.1307153701782227, erank: 1.0471541881
56128, s1: 26.563051223754883, s5: 0.006917017046362162
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depth: 3, iteration: 738000, test_RMSE: 1.1568490266799927, erank: 1.0345767736
434937, s1: 40.727691650390625, s5: 0.007159175351262093
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46521, s1: 41.885982513427734, s5: 0.0071893110871315
depth: 3, iteration: 742000, test_RMSE: 1.162649154663086, erank: 1.03365039825
43945, s1: 42.912017822265625, s5: 0.0072196172550320625
depth: 3, iteration: 744000, test_RMSE: 1.1652384996414185, erank: 1.0333591699
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depth: 3, iteration: 746000, test_RMSE: 1.1676238775253296, erank: 1.0331585407
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depth: 3, iteration: 756000, test_RMSE: 1.1769554615020752, erank: 1.0330870151
519775, s1: 47.45429611206055, s5: 0.007434274535626173
depth: 3, iteration: 758000, test_RMSE: 1.1784101724624634, erank: 1.0332015752
792358, s1: 47.857322692871094, s5: 0.007465296424925327
depth: 3, iteration: 760000, test_RMSE: 1.1797611713409424, erank: 1.0333476066
589355, s1: 48.22345733642578, s5: 0.007496376056224108
depth: 3, iteration: 762000, test_RMSE: 1.181019902229309, erank: 1.03351974487
30469, s1: 48.55752182006836, s5: 0.007527775131165981
depth: 3, iteration: 764000, test_RMSE: 1.1821961402893066, erank: 1.0337170362
472534, s1: 48.864322662353516, s5: 0.007559339981526136
depth: 3, iteration: 766000, test_RMSE: 1.1832993030548096, erank: 1.0339365005
493164, s1: 49.1475944519043, s5: 0.0075912741012871265
depth: 3, iteration: 768000, test_RMSE: 1.1843370199203491, erank: 1.0341764688
491821, s1: 49.41032409667969, s5: 0.007622986566275358
depth: 3, iteration: 770000, test_RMSE: 1.1853158473968506, erank: 1.0344355106
35376, s1: 49.655452728271484, s5: 0.007655376102775335
depth: 3, iteration: 772000, test_RMSE: 1.186241626739502, erank: 1.03471255302

```
4292, s1: 49.884971618652344, s5: 0.007687688805162907
depth: 3, iteration: 774000, test_RMSE: 1.1871191263198853, erank: 1.0350072383
880615, s1: 50.100914001464844, s5: 0.007720105350017548
depth: 3, iteration: 776000, test_RMSE: 1.1879527568817139, erank: 1.0353188514
709473, s1: 50.304649353027344, s5: 0.0077528017573058605
depth: 3, iteration: 778000, test_RMSE: 1.1887462139129639, erank: 1.0356469154
35791, s1: 50.497711181640625, s5: 0.0077855284325778484
depth: 3, iteration: 780000, test_RMSE: 1.1895034313201904, erank: 1.0359897613
52539, s1: 50.681121826171875, s5: 0.007818788290023804
depth: 3, iteration: 782000, test_RMSE: 1.1902258396148682, erank: 1.0363497734
069824, s1: 50.85594177246094, s5: 0.00785190612077713
depth: 3, iteration: 784000, test_RMSE: 1.1909170150756836, erank: 1.0367254018
78357, s1: 51.02287292480469, s5: 0.00788545235991478
depth: 3, iteration: 786000, test_RMSE: 1.19157874584198, erank: 1.037116765975
9521, s1: 51.18272399902344, s5: 0.007919298484921455
depth: 3, iteration: 788000, test_RMSE: 1.192212462425232, erank: 1.03752422332
76367, s1: 51.33589172363281, s5: 0.00795337650924921
depth: 3, iteration: 790000, test_RMSE: 1.1928209066390991, erank: 1.0379480123
519897, s1: 51.483253479003906, s5: 0.007987347431480885
depth: 3, iteration: 792000, test_RMSE: 1.1934043169021606, erank: 1.0383880138
397217, s1: 51.62477111816406, s5: 0.008021839894354343
depth: 3, iteration: 794000, test_RMSE: 1.1939644813537598, erank: 1.0388448238
372803, s1: 51.76114273071289, s5: 0.008056743070483208
depth: 3, iteration: 796000, test_RMSE: 1.1945019960403442, erank: 1.0393193960
18982, s1: 51.89247131347656, s5: 0.00809173658490181
depth: 3, iteration: 798000, test_RMSE: 1.1950194835662842, erank: 1.0398110151
290894, s1: 52.01951217651367, s5: 0.00812707468867302
```

In [10]:
```
for lam in ("0.0", "1e-2"):
    run_and_log(f"F3_gd_d1_lam{lam}",
        **BASE_SYN, depth=1, lam=lam, optim="GD",   lr=LR_GD,   niters=LONG_IT
    run_and_log(f"F3_adam_d1_lam{lam}",
        **BASE_SYN, depth=1, lam=lam, optim="Adam", lr=LR_ADAM, niters=LONG_IT
```

RUN: python /content/content/synth/main.py --method DLNN --data gaussian --N 10
0 --rank 5 --reg_norm ratio --initscale 1e-3 --sample_size 4000 --log_interval
2000 --depth 1 --lam 0.0 --optim GD --lr 1e-3 --niters 800000
depth: 1, iteration: 0, test_RMSE: 1.129388451576233, erank: 80.63429260253906,
s1: 0.0019347229972481728, s5: 0.0017415006877854466
depth: 1, iteration: 2000, test_RMSE: 1.129388451576233, erank: 66.095779418945
31, s1: 0.025106655433773994, s5: 0.016447316855192184
depth: 1, iteration: 4000, test_RMSE: 1.129388451576233, erank: 65.486106872558
6, s1: 0.05022093281149864, s5: 0.032651178538799286
depth: 1, iteration: 6000, test_RMSE: 1.129388451576233, erank: 65.386268615722
66, s1: 0.07532285898923874, s5: 0.04885831102728844
depth: 1, iteration: 8000, test_RMSE: 1.129388451576233, erank: 65.365318298339
84, s1: 0.1004033088684082, s5: 0.06505382806062698
depth: 1, iteration: 10000, test_RMSE: 1.129388451576233, erank: 65.36257171630
86, s1: 0.12545941770076752, s5: 0.08123534917831421
depth: 1, iteration: 12000, test_RMSE: 1.129388451576233, erank: 65.36247253417
969, s1: 0.15049166977405548, s5: 0.09740140289068222
depth: 1, iteration: 14000, test_RMSE: 1.129388451576233, erank: 65.36306762695
312, s1: 0.17549929022789001, s5: 0.11355193704366684
depth: 1, iteration: 16000, test_RMSE: 1.129388451576233, erank: 65.36391448974
61, s1: 0.20048213005065918, s5: 0.12968710064888
depth: 1, iteration: 18000, test_RMSE: 1.129388451576233, erank: 65.36481475830
078, s1: 0.22543974220752716, s5: 0.14580687880516052
depth: 1, iteration: 20000, test_RMSE: 1.129388451576233, erank: 65.36569213867
188, s1: 0.25037258863449097, s5: 0.1619095504283905
depth: 1, iteration: 22000, test_RMSE: 1.129388451576233, erank: 65.36650085449
219, s1: 0.2752813696861267, s5: 0.17799684405326843
depth: 1, iteration: 24000, test_RMSE: 1.129388451576233, erank: 65.36711883544
922, s1: 0.3001660108566284, s5: 0.19406813383102417
depth: 1, iteration: 26000, test_RMSE: 1.129388451576233, erank: 65.36780548095
703, s1: 0.3250233829021454, s5: 0.21012401580810547
depth: 1, iteration: 28000, test_RMSE: 1.129388451576233, erank: 65.36846160888
672, s1: 0.34985437989234924, s5: 0.22616316378116608
depth: 1, iteration: 30000, test_RMSE: 1.129388451576233, erank: 65.36896514892
578, s1: 0.37466710805892944, s5: 0.24218504130840302
depth: 1, iteration: 32000, test_RMSE: 1.129388451576233, erank: 65.36940002441
406, s1: 0.3994518220424652, s5: 0.2581931948661804
depth: 1, iteration: 34000, test_RMSE: 1.129388451576233, erank: 65.36986541748
047, s1: 0.42421022057533264, s5: 0.27418529987335205
depth: 1, iteration: 36000, test_RMSE: 1.129388451576233, erank: 65.37026977539
062, s1: 0.44894519448280334, s5: 0.2901591360569
depth: 1, iteration: 38000, test_RMSE: 1.129388451576233, erank: 65.37061309814
453, s1: 0.4736533761024475, s5: 0.3061160445213318
depth: 1, iteration: 40000, test_RMSE: 1.129388451576233, erank: 65.37095642089
844, s1: 0.4983418583869934, s5: 0.3220624327659607
depth: 1, iteration: 42000, test_RMSE: 1.129388451576233, erank: 65.37129974365
234, s1: 0.5230008959770203, s5: 0.3379882872104645
depth: 1, iteration: 44000, test_RMSE: 1.129388451576233, erank: 65.37148284912
11, s1: 0.5476401448249817, s5: 0.35389935970306396
depth: 1, iteration: 46000, test_RMSE: 1.129388451576233, erank: 65.37179565429
688, s1: 0.57225102186203, s5: 0.3697946071624756
depth: 1, iteration: 48000, test_RMSE: 1.129388451576233, erank: 65.37213897705
078, s1: 0.5968369841575623, s5: 0.38567596673965454
depth: 1, iteration: 50000, test_RMSE: 1.129388451576233, erank: 65.37239074707

031, s1: 0.6214010715484619, s5: 0.40154266357421875
depth: 1, iteration: 52000, test_RMSE: 1.129388451576233, erank: 65.37248229980
469, s1: 0.6459424495697021, s5: 0.4173915684223175
depth: 1, iteration: 54000, test_RMSE: 1.129388451576233, erank: 65.37273406982
422, s1: 0.6704553365707397, s5: 0.43321865797042847
depth: 1, iteration: 56000, test_RMSE: 1.129388451576233, erank: 65.37301635742
188, s1: 0.6949409246444702, s5: 0.44903671741485596
depth: 1, iteration: 58000, test_RMSE: 1.129388451576233, erank: 65.37322998046
875, s1: 0.719401478767395, s5: 0.4648396670818329
depth: 1, iteration: 60000, test_RMSE: 1.129388451576233, erank: 65.37351226806
64, s1: 0.7438362240791321, s5: 0.4806210696697235
depth: 1, iteration: 62000, test_RMSE: 1.129388451576233, erank: 65.37357330322
266, s1: 0.7682597637176514, s5: 0.4963916540145874
depth: 1, iteration: 64000, test_RMSE: 1.129388451576233, erank: 65.37369537353
516, s1: 0.7926515340805054, s5: 0.5121440887451172
depth: 1, iteration: 66000, test_RMSE: 1.129388451576233, erank: 65.37385559082
031, s1: 0.8170170187950134, s5: 0.5278818011283875
depth: 1, iteration: 68000, test_RMSE: 1.129388451576233, erank: 65.37403869628
906, s1: 0.8413585424423218, s5: 0.543605625629425
depth: 1, iteration: 70000, test_RMSE: 1.129388451576233, erank: 65.37419891357
422, s1: 0.8656699061393738, s5: 0.5593111515045166
depth: 1, iteration: 72000, test_RMSE: 1.129388451576233, erank: 65.37435150146
484, s1: 0.8899617195129395, s5: 0.5750007629394531
depth: 1, iteration: 74000, test_RMSE: 1.129388451576233, erank: 65.37438201904
297, s1: 0.9142379760742188, s5: 0.5906763672828674
depth: 1, iteration: 76000, test_RMSE: 1.129388451576233, erank: 65.37442016601
562, s1: 0.9384819269180298, s5: 0.6063368916511536
depth: 1, iteration: 78000, test_RMSE: 1.129388451576233, erank: 65.37454223632
812, s1: 0.9627012014389038, s5: 0.6219808459281921
depth: 1, iteration: 80000, test_RMSE: 1.129388451576233, erank: 65.37466430664
062, s1: 0.9868934154510498, s5: 0.6376065015792847
depth: 1, iteration: 82000, test_RMSE: 1.129388451576233, erank: 65.37472534179
688, s1: 1.011068344116211, s5: 0.6532166600227356
depth: 1, iteration: 84000, test_RMSE: 1.129388451576233, erank: 65.37497711181
64, s1: 1.0352087020874023, s5: 0.6688105463981628
depth: 1, iteration: 86000, test_RMSE: 1.129388451576233, erank: 65.37506866455
078, s1: 1.0593340396881104, s5: 0.6843931674957275
depth: 1, iteration: 88000, test_RMSE: 1.129388451576233, erank: 65.37506866455
078, s1: 1.0834345817565918, s5: 0.699964165687561
depth: 1, iteration: 90000, test_RMSE: 1.129388451576233, erank: 65.37512969970
703, s1: 1.1075078248977661, s5: 0.7155212163925171
depth: 1, iteration: 92000, test_RMSE: 1.129388451576233, erank: 65.37510681152
344, s1: 1.1315730810165405, s5: 0.7310558557510376
depth: 1, iteration: 94000, test_RMSE: 1.129388451576233, erank: 65.37516021728
516, s1: 1.1556082963943481, s5: 0.7465733885765076
depth: 1, iteration: 96000, test_RMSE: 1.129388451576233, erank: 65.37525177001
953, s1: 1.1795982122421265, s5: 0.7620716094970703
depth: 1, iteration: 98000, test_RMSE: 1.129388451576233, erank: 65.37535095214
844, s1: 1.2035819292068481, s5: 0.7775542736053467
depth: 1, iteration: 100000, test_RMSE: 1.129388451576233, erank: 65.3755111694
336, s1: 1.2275280952453613, s5: 0.7930185794830322
depth: 1, iteration: 102000, test_RMSE: 1.129388451576233, erank: 65.3756027221
6797, s1: 1.2514666318893433, s5: 0.8084782958030701
depth: 1, iteration: 104000, test_RMSE: 1.129388451576233, erank: 65.3756637573

2422, s1: 1.2753753662109375, s5: 0.8239226937294006
depth: 1, iteration: 106000, test_RMSE: 1.129388451576233, erank: 65.3756942749
0234, s1: 1.2992507219314575, s5: 0.8393576741218567
depth: 1, iteration: 108000, test_RMSE: 1.129388451576233, erank: 65.3757858276
3672, s1: 1.3231216669082642, s5: 0.854758083820343
depth: 1, iteration: 110000, test_RMSE: 1.129388451576233, erank: 65.3757858276
3672, s1: 1.3469609022140503, s5: 0.8701513409614563
depth: 1, iteration: 112000, test_RMSE: 1.129388451576233, erank: 65.3758850097
6562, s1: 1.3707664012908936, s5: 0.8855404257774353
depth: 1, iteration: 114000, test_RMSE: 1.129388451576233, erank: 65.3758468627
9297, s1: 1.394549012184143, s5: 0.9009069204330444
depth: 1, iteration: 116000, test_RMSE: 1.129388451576233, erank: 65.3758163452
1484, s1: 1.4183127880096436, s5: 0.9162452816963196
depth: 1, iteration: 118000, test_RMSE: 1.129388451576233, erank: 65.3758163452
1484, s1: 1.442055583000183, s5: 0.9315831661224365
depth: 1, iteration: 120000, test_RMSE: 1.129388451576233, erank: 65.3758163452
1484, s1: 1.4657635688781738, s5: 0.946902871131897
depth: 1, iteration: 122000, test_RMSE: 1.129388451576233, erank: 65.3759384155
2734, s1: 1.4894509315490723, s5: 0.9622096419334412
depth: 1, iteration: 124000, test_RMSE: 1.129388451576233, erank: 65.3759155273
4375, s1: 1.5131274461746216, s5: 0.9774978756904602
depth: 1, iteration: 126000, test_RMSE: 1.129388451576233, erank: 65.3759384155
2734, s1: 1.5367769002914429, s5: 0.9927732944488525
depth: 1, iteration: 128000, test_RMSE: 1.129388451576233, erank: 65.3758468627
9297, s1: 1.5604168176651, s5: 1.0080233812332153
depth: 1, iteration: 130000, test_RMSE: 1.129388451576233, erank: 65.3761291503
9062, s1: 1.5840028524398804, s5: 1.0232731103897095
depth: 1, iteration: 132000, test_RMSE: 1.129388451576233, erank: 65.3762207031
25, s1: 1.6075812578201294, s5: 1.038500428199768
depth: 1, iteration: 134000, test_RMSE: 1.129388451576233, erank: 65.3763809204
1016, s1: 1.631130337715149, s5: 1.0537054538726807
depth: 1, iteration: 136000, test_RMSE: 1.129388451576233, erank: 65.3762893676
7578, s1: 1.6546664237976074, s5: 1.0688951015472412
depth: 1, iteration: 138000, test_RMSE: 1.129388451576233, erank: 65.3763198852
539, s1: 1.678164005279541, s5: 1.0840744972229004
depth: 1, iteration: 140000, test_RMSE: 1.129388451576233, erank: 65.3763427734
375, s1: 1.7016464471817017, s5: 1.0992330312728882
depth: 1, iteration: 142000, test_RMSE: 1.129388451576233, erank: 65.3762512207
0312, s1: 1.7251241207122803, s5: 1.1143876314163208
depth: 1, iteration: 144000, test_RMSE: 1.129388451576233, erank: 65.3761978149
414, s1: 1.7485655546188354, s5: 1.129533290863037
depth: 1, iteration: 146000, test_RMSE: 1.129388451576233, erank: 65.3761291503
9062, s1: 1.7719875574111938, s5: 1.144660472869873
depth: 1, iteration: 148000, test_RMSE: 1.129388451576233, erank: 65.3761596679
6875, s1: 1.7953659296035767, s5: 1.1597665548324585
depth: 1, iteration: 150000, test_RMSE: 1.129388451576233, erank: 65.3761291503
9062, s1: 1.8187307119369507, s5: 1.1748684644699097
depth: 1, iteration: 152000, test_RMSE: 1.129388451576233, erank: 65.3761291503
9062, s1: 1.8420782089233398, s5: 1.1899428367614746
depth: 1, iteration: 154000, test_RMSE: 1.129388451576233, erank: 65.3761596679
6875, s1: 1.8653942346572876, s5: 1.205004334449768
depth: 1, iteration: 156000, test_RMSE: 1.129388451576233, erank: 65.3761596679
6875, s1: 1.8886795043945312, s5: 1.2200485467910767
depth: 1, iteration: 158000, test_RMSE: 1.129388451576233, erank: 65.3763427734

375, s1: 1.911941647529602, s5: 1.235077142715454
depth: 1, iteration: 160000, test_RMSE: 1.129388451576233, erank: 65.3764724731
4453, s1: 1.9351850748062134, s5: 1.2500907182693481
depth: 1, iteration: 162000, test_RMSE: 1.129388451576233, erank: 65.3766555786
1328, s1: 1.958398699760437, s5: 1.265090823173523
depth: 1, iteration: 164000, test_RMSE: 1.129388451576233, erank: 65.3766555786
1328, s1: 1.9815999269485474, s5: 1.2800623178482056
depth: 1, iteration: 166000, test_RMSE: 1.129388451576233, erank: 65.3766937255
8594, s1: 2.0047607421875, s5: 1.2950276136398315
depth: 1, iteration: 168000, test_RMSE: 1.129388451576233, erank: 65.3766021728
5156, s1: 2.0279345512390137, s5: 1.3099802732467651
depth: 1, iteration: 170000, test_RMSE: 1.129388451576233, erank: 65.3766250610
3516, s1: 2.051058292388916, s5: 1.324912428855896
depth: 1, iteration: 172000, test_RMSE: 1.129388451576233, erank: 65.3766937255
8594, s1: 2.074176549911499, s5: 1.339835524559021
depth: 1, iteration: 174000, test_RMSE: 1.129388451576233, erank: 65.3766021728
5156, s1: 2.0972654819488525, s5: 1.3547443151474
depth: 1, iteration: 176000, test_RMSE: 1.129388451576233, erank: 65.3765335083
0078, s1: 2.120338201522827, s5: 1.36965012550354
depth: 1, iteration: 178000, test_RMSE: 1.129388451576233, erank: 65.3765335083
0078, s1: 2.143388271331787, s5: 1.3845114707946777
depth: 1, iteration: 180000, test_RMSE: 1.129388451576233, erank: 65.3764724731
4453, s1: 2.166395902633667, s5: 1.3993831872940063
depth: 1, iteration: 182000, test_RMSE: 1.129388451576233, erank: 65.3764114379
8828, s1: 2.189399242401123, s5: 1.4142320156097412
depth: 1, iteration: 184000, test_RMSE: 1.129388451576233, erank: 65.3762893676
7578, s1: 2.2123875617980957, s5: 1.4290826320648193
depth: 1, iteration: 186000, test_RMSE: 1.129388451576233, erank: 65.3762893676
7578, s1: 2.2353079319000244, s5: 1.443907618522644
depth: 1, iteration: 188000, test_RMSE: 1.129388451576233, erank: 65.3763427734
375, s1: 2.25821852684021, s5: 1.4587082862854004
depth: 1, iteration: 190000, test_RMSE: 1.129388451576233, erank: 65.3763427734
375, s1: 2.2811226844787598, s5: 1.4734961986541748
depth: 1, iteration: 192000, test_RMSE: 1.129388451576233, erank: 65.3764114379
8828, s1: 2.30399227142334, s5: 1.4882700443267822
depth: 1, iteration: 194000, test_RMSE: 1.129388451576233, erank: 65.3764114379
8828, s1: 2.32686448097229, s5: 1.5030322074890137
depth: 1, iteration: 196000, test_RMSE: 1.129388451576233, erank: 65.3764724731
4453, s1: 2.3496856689453125, s5: 1.5177772045135498
depth: 1, iteration: 198000, test_RMSE: 1.129388451576233, erank: 65.3765335083
0078, s1: 2.3724942207336426, s5: 1.532516360282898
depth: 1, iteration: 200000, test_RMSE: 1.129388451576233, erank: 65.3765335083
0078, s1: 2.3952689170837402, s5: 1.5472334623336792
depth: 1, iteration: 202000, test_RMSE: 1.129388451576233, erank: 65.3766555786
1328, s1: 2.4180285930633545, s5: 1.5619362592697144
depth: 1, iteration: 204000, test_RMSE: 1.129388451576233, erank: 65.3767547607
4219, s1: 2.4407730102539062, s5: 1.5766197443008423
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9844, s1: 2.4862101078033447, s5: 1.6059499979019165
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7656, s1: 2.508888006210327, s5: 1.6205809116363525
depth: 1, iteration: 212000, test_RMSE: 1.129388451576233, erank: 65.3768463134

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6406, s1: 2.711954116821289, s5: 1.7517274618148804
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depth: 1, iteration: 234000, test_RMSE: 1.129388451576233, erank: 65.3765335083
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4219, s1: 2.913135051727295, s5: 1.8816847801208496
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3281, s1: 2.957610607147217, s5: 1.9104286432266235
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6172, s1: 2.9798223972320557, s5: 1.9247705936431885
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depth: 1, iteration: 298000, test_RMSE: 1.129388451576233, erank: 65.3772506713
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289, s1: 4.583175182342529, s5: 2.960197925567627
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164, s1: 4.685859203338623, s5: 3.0265603065490723
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1797, s1: 5.191554069519043, s5: 3.353181838989258
depth: 1, iteration: 464000, test_RMSE: 1.129388451576233, erank: 65.3770065307
6172, s1: 5.211547374725342, s5: 3.3660452365875244
depth: 1, iteration: 466000, test_RMSE: 1.129388451576233, erank: 65.3770294189
4531, s1: 5.231472015380859, s5: 3.378894805908203
depth: 1, iteration: 468000, test_RMSE: 1.129388451576233, erank: 65.3770294189
4531, s1: 5.251397609710693, s5: 3.391737937927246
depth: 1, iteration: 470000, test_RMSE: 1.129388451576233, erank: 65.3770294189
4531, s1: 5.271305561065674, s5: 3.4045732021331787
depth: 1, iteration: 472000, test_RMSE: 1.129388451576233, erank: 65.3769760131
836, s1: 5.291223526000977, s5: 3.4174084663391113
depth: 1, iteration: 474000, test_RMSE: 1.129388451576233, erank: 65.3769760131
836, s1: 5.311069488525391, s5: 3.4302103519439697
depth: 1, iteration: 476000, test_RMSE: 1.129388451576233, erank: 65.3770294189
4531, s1: 5.330911159515381, s5: 3.4430243968963623
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836, s1: 5.350759983062744, s5: 3.455850601196289
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836, s1: 5.370598316192627, s5: 3.4686262607574463
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3281, s1: 5.410178184509277, s5: 3.4941840171813965
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depth: 1, iteration: 488000, test_RMSE: 1.129388451576233, erank: 65.3767547607
4219, s1: 5.449706554412842, s5: 3.5197064876556396
depth: 1, iteration: 490000, test_RMSE: 1.129388451576233, erank: 65.3768463134
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depth: 1, iteration: 492000, test_RMSE: 1.129388451576233, erank: 65.3767547607
4219, s1: 5.489124774932861, s5: 3.545126438140869
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depth: 1, iteration: 504000, test_RMSE: 1.129388451576233, erank: 65.3771591186
5234, s1: 5.606869220733643, s5: 3.6212337017059326
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5938, s1: 5.626433849334717, s5: 3.633871555328369
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211, s1: 5.645961761474609, s5: 3.6465141773223877
depth: 1, iteration: 510000, test_RMSE: 1.129388451576233, erank: 65.3775939941
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depth: 1, iteration: 512000, test_RMSE: 1.129388451576233, erank: 65.3777160644
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depth: 1, iteration: 516000, test_RMSE: 1.129388451576233, erank: 65.3779678344
7266, s1: 5.723827838897705, s5: 3.6969425678253174
depth: 1, iteration: 518000, test_RMSE: 1.129388451576233, erank: 65.3782196044
9219, s1: 5.743242263793945, s5: 3.709505796432495
depth: 1, iteration: 520000, test_RMSE: 1.129388451576233, erank: 65.3784332275
3906, s1: 5.762667179107666, s5: 3.7220406532287598
depth: 1, iteration: 522000, test_RMSE: 1.129388451576233, erank: 65.3786544799
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depth: 1, iteration: 524000, test_RMSE: 1.129388451576233, erank: 65.3787155151
3672, s1: 5.801420211791992, s5: 3.747098684310913
depth: 1, iteration: 526000, test_RMSE: 1.129388451576233, erank: 65.3788452148
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depth: 1, iteration: 528000, test_RMSE: 1.129388451576233, erank: 65.3788757324
2188, s1: 5.8401408195495605, s5: 3.772087812423706
depth: 1, iteration: 530000, test_RMSE: 1.129388451576233, erank: 65.3789367675
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s1: 5.878689289093018, s5: 3.7970454692840576
depth: 1, iteration: 534000, test_RMSE: 1.129388451576233, erank: 65.3788452148
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depth: 1, iteration: 536000, test_RMSE: 1.129388451576233, erank: 65.3787460327

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depth: 1, iteration: 540000, test_RMSE: 1.129388451576233, erank: 65.3784027099
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7266, s1: 6.18467903137207, s5: 3.99452543258667
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depth: 1, iteration: 568000, test_RMSE: 1.129388451576233, erank: 65.3778457641
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depth: 1, iteration: 570000, test_RMSE: 1.129388451576233, erank: 65.3778457641
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depth: 1, iteration: 572000, test_RMSE: 1.129388451576233, erank: 65.3776245117
1875, s1: 6.260491847991943, s5: 4.043376445770264
depth: 1, iteration: 574000, test_RMSE: 1.129388451576233, erank: 65.3775024414
0625, s1: 6.279430389404297, s5: 4.055549144744873
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depth: 1, iteration: 580000, test_RMSE: 1.129388451576233, erank: 65.3773422241
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depth: 1, iteration: 582000, test_RMSE: 1.129388451576233, erank: 65.3772201538
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depth: 1, iteration: 584000, test_RMSE: 1.129388451576233, erank: 65.3772201538
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depth: 1, iteration: 586000, test_RMSE: 1.129388451576233, erank: 65.3772201538
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depth: 1, iteration: 590000, test_RMSE: 1.129388451576233, erank: 65.3773422241

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depth: 1, iteration: 594000, test_RMSE: 1.129388451576233, erank: 65.3773117065
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depth: 1, iteration: 598000, test_RMSE: 1.129388451576233, erank: 65.3773803710
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625, s1: 6.56033992767334, s5: 4.237094879150391
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depth: 1, iteration: 618000, test_RMSE: 1.129388451576233, erank: 65.3779373168
9453, s1: 6.690098762512207, s5: 4.320950508117676
depth: 1, iteration: 620000, test_RMSE: 1.129388451576233, erank: 65.3780975341
7969, s1: 6.708571910858154, s5: 4.332903861999512
depth: 1, iteration: 622000, test_RMSE: 1.129388451576233, erank: 65.3781890869
1406, s1: 6.727034568786621, s5: 4.344827175140381
depth: 1, iteration: 624000, test_RMSE: 1.129388451576233, erank: 65.3782501220
7031, s1: 6.745476722717285, s5: 4.356788158416748
depth: 1, iteration: 626000, test_RMSE: 1.129388451576233, erank: 65.3783416748
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7344, s1: 6.855575084686279, s5: 4.428129196166992
depth: 1, iteration: 638000, test_RMSE: 1.129388451576233, erank: 65.3785934448
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depth: 1, iteration: 642000, test_RMSE: 1.129388451576233, erank: 65.3785934448
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depth: 1, iteration: 644000, test_RMSE: 1.129388451576233, erank: 65.3785934448

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depth: 1, iteration: 648000, test_RMSE: 1.129388451576233, erank: 65.3786544799
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depth: 1, iteration: 650000, test_RMSE: 1.129388451576233, erank: 65.3785934448
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depth: 1, iteration: 652000, test_RMSE: 1.129388451576233, erank: 65.3785247802
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depth: 1, iteration: 654000, test_RMSE: 1.129388451576233, erank: 65.3785934448
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depth: 1, iteration: 666000, test_RMSE: 1.129388451576233, erank: 65.3785247802
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depth: 1, iteration: 668000, test_RMSE: 1.129388451576233, erank: 65.3784713745
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depth: 1, iteration: 670000, test_RMSE: 1.129388451576233, erank: 65.3785247802
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depth: 1, iteration: 672000, test_RMSE: 1.129388451576233, erank: 65.3785247802
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depth: 1, iteration: 674000, test_RMSE: 1.129388451576233, erank: 65.3785018920
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depth: 1, iteration: 676000, test_RMSE: 1.129388451576233, erank: 65.3784713745
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depth: 1, iteration: 678000, test_RMSE: 1.129388451576233, erank: 65.3785934448
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461, s1: 7.253933429718018, s5: 4.685736179351807
depth: 1, iteration: 682000, test_RMSE: 1.129388451576233, erank: 65.3785934448
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depth: 1, iteration: 690000, test_RMSE: 1.129388451576233, erank: 65.3785247802
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depth: 1, iteration: 716000, test_RMSE: 1.129388451576233, erank: 65.3783416748
0469, s1: 7.573647975921631, s5: 4.8918962478637695
depth: 1, iteration: 718000, test_RMSE: 1.129388451576233, erank: 65.3783416748
0469, s1: 7.591256618499756, s5: 4.9032511711120605
depth: 1, iteration: 720000, test_RMSE: 1.129388451576233, erank: 65.3784027099
6094, s1: 7.608865737915039, s5: 4.914647579193115
depth: 1, iteration: 722000, test_RMSE: 1.129388451576233, erank: 65.3784027099
6094, s1: 7.626498699188232, s5: 4.925992488861084
depth: 1, iteration: 724000, test_RMSE: 1.129388451576233, erank: 65.3784713745
1172, s1: 7.644110679626465, s5: 4.937265396118164
depth: 1, iteration: 726000, test_RMSE: 1.129388451576233, erank: 65.3784713745
1172, s1: 7.661661624908447, s5: 4.948627948760986
depth: 1, iteration: 728000, test_RMSE: 1.129388451576233, erank: 65.3784332275
3906, s1: 7.67924690246582, s5: 4.9599609375
depth: 1, iteration: 730000, test_RMSE: 1.129388451576233, erank: 65.3785018920
8984, s1: 7.6967597007751465, s5: 4.971234321594238
depth: 1, iteration: 732000, test_RMSE: 1.129388451576233, erank: 65.3785247802
7344, s1: 7.714295864105225, s5: 4.982519626617432
depth: 1, iteration: 734000, test_RMSE: 1.129388451576233, erank: 65.3785018920
8984, s1: 7.731789588928223, s5: 4.99376916885376
depth: 1, iteration: 736000, test_RMSE: 1.129388451576233, erank: 65.3785629272
461, s1: 7.749192237854004, s5: 5.005049228668213
depth: 1, iteration: 738000, test_RMSE: 1.129388451576233, erank: 65.3785934448
2422, s1: 7.766638278961182, s5: 5.016298770904541
depth: 1, iteration: 740000, test_RMSE: 1.129388451576233, erank: 65.3786849975
586, s1: 7.784031867980957, s5: 5.027519702911377
depth: 1, iteration: 742000, test_RMSE: 1.129388451576233, erank: 65.3787155151
3672, s1: 7.801393508911133, s5: 5.0387420654296875
depth: 1, iteration: 744000, test_RMSE: 1.129388451576233, erank: 65.3787460327
1484, s1: 7.818779468536377, s5: 5.049977779388428
depth: 1, iteration: 746000, test_RMSE: 1.129388451576233, erank: 65.3788452148
4375, s1: 7.836112976074219, s5: 5.061140537261963
depth: 1, iteration: 748000, test_RMSE: 1.129388451576233, erank: 65.3788452148
4375, s1: 7.853438377380371, s5: 5.0723042488098145
depth: 1, iteration: 750000, test_RMSE: 1.129388451576233, erank: 65.37890625,
s1: 7.870701789855957, s5: 5.083494186401367
depth: 1, iteration: 752000, test_RMSE: 1.129388451576233, erank: 65.3789672851

5625, s1: 7.887970447540283, s5: 5.094629764556885
depth: 1, iteration: 754000, test_RMSE: 1.129388451576233, erank: 65.3789672851
5625, s1: 7.90527868270874, s5: 5.10579252243042
depth: 1, iteration: 756000, test_RMSE: 1.129388451576233, erank: 65.3790588378
9062, s1: 7.922473907470703, s5: 5.116911888122559
depth: 1, iteration: 758000, test_RMSE: 1.129388451576233, erank: 65.3791198730
4688, s1: 7.939672946929932, s5: 5.1280364990234375
depth: 1, iteration: 760000, test_RMSE: 1.129388451576233, erank: 65.3791885375
9766, s1: 7.956871032714844, s5: 5.139138698577881
depth: 1, iteration: 762000, test_RMSE: 1.129388451576233, erank: 65.3792114257
8125, s1: 7.97399377822876, s5: 5.150224685668945
depth: 1, iteration: 764000, test_RMSE: 1.129388451576233, erank: 65.3793411254
8828, s1: 7.991099834442139, s5: 5.161290645599365
depth: 1, iteration: 766000, test_RMSE: 1.129388451576233, erank: 65.3794326782
2266, s1: 8.008237838745117, s5: 5.172372341156006
depth: 1, iteration: 768000, test_RMSE: 1.129388451576233, erank: 65.3794937133
789, s1: 8.025338172912598, s5: 5.183413028717041
depth: 1, iteration: 770000, test_RMSE: 1.129388451576233, erank: 65.3795928955
0781, s1: 8.042387008666992, s5: 5.194485187530518
depth: 1, iteration: 772000, test_RMSE: 1.129388451576233, erank: 65.3796539306
6406, s1: 8.059490203857422, s5: 5.2055230140686035
depth: 1, iteration: 774000, test_RMSE: 1.129388451576233, erank: 65.3797760009
7656, s1: 8.076496124267578, s5: 5.2165727615356445
depth: 1, iteration: 776000, test_RMSE: 1.129388451576233, erank: 65.3798980712
8906, s1: 8.09350299835205, s5: 5.2275776863098145
depth: 1, iteration: 778000, test_RMSE: 1.129388451576233, erank: 65.3799667358
3984, s1: 8.110552787780762, s5: 5.238574981689453
depth: 1, iteration: 780000, test_RMSE: 1.129388451576233, erank: 65.3799667358
3984, s1: 8.127632141113281, s5: 5.249549388885498
depth: 1, iteration: 782000, test_RMSE: 1.129388451576233, erank: 65.3799667358
3984, s1: 8.144617080688477, s5: 5.260532855987549
depth: 1, iteration: 784000, test_RMSE: 1.129388451576233, erank: 65.3799972534
1797, s1: 8.161637306213379, s5: 5.271458625793457
depth: 1, iteration: 786000, test_RMSE: 1.129388451576233, erank: 65.3799667358
3984, s1: 8.178644180297852, s5: 5.2824249267578125
depth: 1, iteration: 788000, test_RMSE: 1.129388451576233, erank: 65.3800277709
961, s1: 8.195670127868652, s5: 5.293374538421631
depth: 1, iteration: 790000, test_RMSE: 1.129388451576233, erank: 65.3800277709
961, s1: 8.212568283081055, s5: 5.304340839385986
depth: 1, iteration: 792000, test_RMSE: 1.129388451576233, erank: 65.3799667358
3984, s1: 8.229517936706543, s5: 5.3152899742126465
depth: 1, iteration: 794000, test_RMSE: 1.129388451576233, erank: 65.3799667358
3984, s1: 8.246498107910156, s5: 5.326203346252441
depth: 1, iteration: 796000, test_RMSE: 1.129388451576233, erank: 65.3798980712
8906, s1: 8.263460159301758, s5: 5.337158679962158
depth: 1, iteration: 798000, test_RMSE: 1.129388451576233, erank: 65.3798980712
8906, s1: 8.280402183532715, s5: 5.348091125488281

RUN: python /content/content/synth/main.py --method DLNN --data gaussian --N 10
0 --rank 5 --reg_norm ratio --initscale 1e-3 --sample_size 4000 --log_interval
2000 --depth 1 --lam 0.0 --optim Adam --lr 1e-3 --niters 30000
depth: 1, iteration: 0, test_RMSE: 1.1278135776519775, erank: 76.3040008544921
9, s1: 0.018671663478016853, s5: 0.015004964545369148
depth: 1, iteration: 2000, test_RMSE: 1.1278135776519775, erank: 69.57570648193

36, s1: 17.799293518066406, s5: 13.286659240722656
depth: 1, iteration: 4000, test_RMSE: 1.1278135776519775, erank: 67.13298034667
969, s1: 21.592870712280273, s5: 15.757697105407715
depth: 1, iteration: 6000, test_RMSE: 1.1278135776519775, erank: 66.56858062744
14, s1: 22.308605194091797, s5: 16.094003677368164
depth: 1, iteration: 8000, test_RMSE: 1.1278135776519775, erank: 66.51020050048
828, s1: 22.37144660949707, s5: 16.10695457458496
depth: 1, iteration: 10000, test_RMSE: 1.1278135776519775, erank: 66.5084533691
4062, s1: 22.37373161315918, s5: 16.10698127746582
depth: 1, iteration: 12000, test_RMSE: 1.1278135776519775, erank: 66.5085144042
9688, s1: 22.373680114746094, s5: 16.1069278717041
depth: 1, iteration: 14000, test_RMSE: 1.1278135776519775, erank: 66.5084228515
625, s1: 22.373754501342773, s5: 16.10698699951172
depth: 1, iteration: 16000, test_RMSE: 1.1278135776519775, erank: 66.5084838867
1875, s1: 22.373754501342773, s5: 16.1069278717041
depth: 1, iteration: 18000, test_RMSE: 1.1278135776519775, erank: 66.5084838867
1875, s1: 22.37367057800293, s5: 16.107004165649414
depth: 1, iteration: 20000, test_RMSE: 1.1278135776519775, erank: 66.5085525512
6953, s1: 22.37350082397461, s5: 16.106956481933594
depth: 1, iteration: 22000, test_RMSE: 1.1278135776519775, erank: 66.5084838867
1875, s1: 22.37363052368164, s5: 16.106971740722656
depth: 1, iteration: 24000, test_RMSE: 1.1278135776519775, erank: 66.5085525512
6953, s1: 22.37350082397461, s5: 16.106956481933594
depth: 1, iteration: 26000, test_RMSE: 1.1278135776519775, erank: 66.5084838867
1875, s1: 22.37374496459961, s5: 16.10698699951172
depth: 1, iteration: 28000, test_RMSE: 1.1278135776519775, erank: 66.5085525512
6953, s1: 22.37350082397461, s5: 16.106956481933594

RUN: python /content/content/synth/main.py --method DLNN --data gaussian --N 10
0 --rank 5 --reg_norm ratio --initscale 1e-3 --sample_size 4000 --log_interval
2000 --depth 1 --lam 1e-2 --optim GD --lr 1e-3 --niters 800000
depth: 1, iteration: 0, test_RMSE: 1.1314451694488525, erank: 76.3760757446289,
s1: 0.0026101309340447187, s5: 0.002271020784974098
depth: 1, iteration: 2000, test_RMSE: 1.1314349174499512, erank: 1.742164373397
8271, s1: 0.07887715846300125, s5: 0.0001268037303816527
depth: 1, iteration: 4000, test_RMSE: 1.1314337253570557, erank: 1.520890712738
037, s1: 0.09427691251039505, s5: 0.00010611215839162469
depth: 1, iteration: 6000, test_RMSE: 1.1314326524734497, erank: 1.413182139396
6675, s1: 0.10525203496217728, s5: 9.505931666353717e-05
depth: 1, iteration: 8000, test_RMSE: 1.1314316987991333, erank: 1.356327176094
0552, s1: 0.11443479359149933, s5: 8.700563193997368e-05
depth: 1, iteration: 10000, test_RMSE: 1.1314306259155273, erank: 1.32409632205
96313, s1: 0.12274536490440369, s5: 7.952041778480634e-05
depth: 1, iteration: 12000, test_RMSE: 1.1314295530319214, erank: 1.28537392616
27197, s1: 0.13063113391399384, s5: 7.150768942665309e-05
depth: 1, iteration: 14000, test_RMSE: 1.1314277648925781, erank: 1.25715291500
09155, s1: 0.13835203647613525, s5: 7.01474491506815e-05
depth: 1, iteration: 16000, test_RMSE: 1.1314259767532349, erank: 1.23962283134
46045, s1: 0.1460801362991333, s5: 6.62084567011334e-05
depth: 1, iteration: 18000, test_RMSE: 1.1314235925674438, erank: 1.20969641208
64868, s1: 0.15393859148025513, s5: 6.156103336252272e-05
depth: 1, iteration: 20000, test_RMSE: 1.1314207315444946, erank: 1.18891251087
18872, s1: 0.16201922297477722, s5: 5.831431190017611e-05
depth: 1, iteration: 22000, test_RMSE: 1.1314172744750977, erank: 1.17412877082

8247, s1: 0.17039212584495544, s5: 5.701229747501202e-05
depth: 1, iteration: 24000, test_RMSE: 1.1314133405685425, erank: 1.15684401988
98315, s1: 0.17911100387573242, s5: 5.377516936277971e-05
depth: 1, iteration: 26000, test_RMSE: 1.1314088106155396, erank: 1.14794456958
77075, s1: 0.18821589648723602, s5: 5.480875552166253e-05
depth: 1, iteration: 28000, test_RMSE: 1.1314036846160889, erank: 1.12989413738
25073, s1: 0.1977350413799286, s5: 4.747866478282958e-05
depth: 1, iteration: 30000, test_RMSE: 1.1313979625701904, erank: 1.11772108078
00293, s1: 0.20768864452838898, s5: 4.716530747828074e-05
depth: 1, iteration: 32000, test_RMSE: 1.1313917636871338, erank: 1.10931789875
03052, s1: 0.21808511018753052, s5: 4.519701178651303e-05
depth: 1, iteration: 34000, test_RMSE: 1.1313849687576294, erank: 1.10047161579
13208, s1: 0.22892966866493225, s5: 4.172511398792267e-05
depth: 1, iteration: 36000, test_RMSE: 1.1313775777816772, erank: 1.09197688102
72217, s1: 0.24021822214126587, s5: 4.079929203726351e-05
depth: 1, iteration: 38000, test_RMSE: 1.131369709968567, erank: 1.085700869560
2417, s1: 0.25194332003593445, s5: 3.929105514544062e-05
depth: 1, iteration: 40000, test_RMSE: 1.131361484527588, erank: 1.074059247970
581, s1: 0.26409289240837097, s5: 3.60980884579476e-05
depth: 1, iteration: 42000, test_RMSE: 1.1313527822494507, erank: 1.06944453716
27808, s1: 0.2766552269458771, s5: 3.439066495047882e-05
depth: 1, iteration: 44000, test_RMSE: 1.1313436031341553, erank: 1.06521821022
0337, s1: 0.2896078824996948, s5: 3.5140888940077275e-05
depth: 1, iteration: 46000, test_RMSE: 1.1313341856002808, erank: 1.05825114250
1831, s1: 0.3029397130012512, s5: 3.2598731195321307e-05
depth: 1, iteration: 48000, test_RMSE: 1.1313241720199585, erank: 1.05654954910
27832, s1: 0.31662940979003906, s5: 3.100370668107644e-05
depth: 1, iteration: 50000, test_RMSE: 1.1313140392303467, erank: 1.04921543598
17505, s1: 0.33065930008888245, s5: 3.0213694117264822e-05
depth: 1, iteration: 52000, test_RMSE: 1.1313035488128662, erank: 1.04476749897
00317, s1: 0.345012366771698, s5: 2.7567190045374446e-05
depth: 1, iteration: 54000, test_RMSE: 1.131292700767517, erank: 1.042999744415
2832, s1: 0.3596690595149994, s5: 2.77571270999033e-05
depth: 1, iteration: 56000, test_RMSE: 1.1312816143035889, erank: 1.03936922550
20142, s1: 0.3746105432510376, s5: 2.7344163754605688e-05
depth: 1, iteration: 58000, test_RMSE: 1.131270408630371, erank: 1.037289857864
3799, s1: 0.3898230195045471, s5: 2.721527016547043e-05
depth: 1, iteration: 60000, test_RMSE: 1.1312588453292847, erank: 1.03425884246
82617, s1: 0.4052872955799103, s5: 2.4661510906298645e-05
depth: 1, iteration: 62000, test_RMSE: 1.1312470436096191, erank: 1.03154551982
87964, s1: 0.4209936261177063, s5: 2.319494160474278e-05
depth: 1, iteration: 64000, test_RMSE: 1.131235122680664, erank: 1.029598474502
5635, s1: 0.43692222237586975, s5: 2.306915121152997e-05
depth: 1, iteration: 66000, test_RMSE: 1.1312229633331299, erank: 1.02814328670
5017, s1: 0.4530662000179291, s5: 2.2923619326320477e-05
depth: 1, iteration: 68000, test_RMSE: 1.1312108039855957, erank: 1.02657353878
02124, s1: 0.46940138936042786, s5: 2.2010361135471612e-05
depth: 1, iteration: 70000, test_RMSE: 1.1311984062194824, erank: 1.02485764026
64185, s1: 0.48593419790267944, s5: 2.1424451915663667e-05
depth: 1, iteration: 72000, test_RMSE: 1.13118577003479, erank: 1.0234256982803
345, s1: 0.502634584903717, s5: 2.078042962239124e-05
depth: 1, iteration: 74000, test_RMSE: 1.1311731338500977, erank: 1.02284348011
01685, s1: 0.5195059776306152, s5: 2.035166289715562e-05
depth: 1, iteration: 76000, test_RMSE: 1.1311603784561157, erank: 1.02034914493

5608, s1: 0.5365304350852966, s5: 1.943835559359286e-05
depth: 1, iteration: 78000, test_RMSE: 1.1311473846435547, erank: 1.01934564113
61694, s1: 0.5537043809890747, s5: 2.0567065803334117e-05
depth: 1, iteration: 80000, test_RMSE: 1.1311343908309937, erank: 1.01848423480
98755, s1: 0.571021318435669, s5: 1.8800419638864696e-05
depth: 1, iteration: 82000, test_RMSE: 1.131121277809143, erank: 1.018239974975
586, s1: 0.5884658098220825, s5: 1.8411363271297887e-05
depth: 1, iteration: 84000, test_RMSE: 1.1311081647872925, erank: 1.01645052433
01392, s1: 0.6060341596603394, s5: 1.7337813915219158e-05
depth: 1, iteration: 86000, test_RMSE: 1.1310948133468628, erank: 1.01601016521
45386, s1: 0.6237242817878723, s5: 1.6582107491558418e-05
depth: 1, iteration: 88000, test_RMSE: 1.131081461906433, erank: 1.014736890792
8467, s1: 0.6415268778800964, s5: 1.65241308422992e-05
depth: 1, iteration: 90000, test_RMSE: 1.1310679912567139, erank: 1.01455473899
8413, s1: 0.6594281792640686, s5: 1.588968007126823e-05
depth: 1, iteration: 92000, test_RMSE: 1.1310546398162842, erank: 1.01545095443
72559, s1: 0.6774398684501648, s5: 1.8866971004172228e-05
depth: 1, iteration: 94000, test_RMSE: 1.1310409307479858, erank: 1.01328647136
68823, s1: 0.6955479979515076, s5: 1.5258241546689533e-05
depth: 1, iteration: 96000, test_RMSE: 1.131027340888977, erank: 1.012340426445
0073, s1: 0.7137336134910583, s5: 1.5186511518550105e-05
depth: 1, iteration: 98000, test_RMSE: 1.1310137510299683, erank: 1.01212203502
65503, s1: 0.7320166230201721, s5: 1.619010254216846e-05
depth: 1, iteration: 100000, test_RMSE: 1.1309999227523804, erank: 1.0115675926
208496, s1: 0.7503824830055237, s5: 1.3683826182386838e-05
depth: 1, iteration: 102000, test_RMSE: 1.130986213684082, erank: 1.01073622703
55225, s1: 0.768822968006134, s5: 1.4727528650837485e-05
depth: 1, iteration: 104000, test_RMSE: 1.1309723854064941, erank: 1.0102436542
510986, s1: 0.7873379588127136, s5: 1.3005459929974131e-05
depth: 1, iteration: 106000, test_RMSE: 1.1309585571289062, erank: 1.0099884271
621704, s1: 0.8059223294258118, s5: 1.3835794561600778e-05
depth: 1, iteration: 108000, test_RMSE: 1.1309446096420288, erank: 1.0092437267
303467, s1: 0.8245754241943359, s5: 1.3025905900576618e-05
depth: 1, iteration: 110000, test_RMSE: 1.130930781364441, erank: 1.00893938541
41235, s1: 0.8432869911193848, s5: 1.3564776963903569e-05
depth: 1, iteration: 112000, test_RMSE: 1.130916714668274, erank: 1.00963795185
08911, s1: 0.8620649576187134, s5: 1.4991996977187227e-05
depth: 1, iteration: 114000, test_RMSE: 1.130902886390686, erank: 1.00911736488
34229, s1: 0.880914032459259, s5: 1.3309625501278788e-05
depth: 1, iteration: 116000, test_RMSE: 1.130888819694519, erank: 1.00843691825
8667, s1: 0.8998008966445923, s5: 1.3087540537526365e-05
depth: 1, iteration: 118000, test_RMSE: 1.130874752998352, erank: 1.00827121734
61914, s1: 0.9187561869621277, s5: 1.2694225006271154e-05
depth: 1, iteration: 120000, test_RMSE: 1.130860686302185, erank: 1.00843846797
94312, s1: 0.9377554655075073, s5: 1.3828684132022317e-05
depth: 1, iteration: 122000, test_RMSE: 1.1308461427688599, erank: 1.0118680000
305176, s1: 0.9568192958831787, s5: 1.238464938069228e-05
depth: 1, iteration: 124000, test_RMSE: 1.1308313608169556, erank: 1.0177471637
72583, s1: 0.9759303331375122, s5: 1.2451905604393687e-05
depth: 1, iteration: 126000, test_RMSE: 1.130816102027893, erank: 1.02501726150
5127, s1: 0.9951127171516418, s5: 1.260701992578106e-05
depth: 1, iteration: 128000, test_RMSE: 1.1308006048202515, erank: 1.0337961912
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97998, s1: 1.0531128644943237, s5: 1.4612935046898201e-05
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97461, s1: 1.1119362115859985, s5: 1.3362652680370957e-05
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166992, s1: 1.1919690370559692, s5: 1.2335425708442926e-05
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46948, s1: 1.2328062057495117, s5: 1.2139755199314095e-05
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68018, s1: 1.2534277439117432, s5: 1.232054091815371e-05
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555786, s1: 1.2741771936416626, s5: 4.4612123019760475e-05
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375, s1: 1.93120539188385, s5: 0.10123571753501892
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depth: 1, iteration: 628000, test_RMSE: 1.1248204708099365, erank: 26.208059310
913086, s1: 6.816690921783447, s5: 2.6930627822875977
depth: 1, iteration: 630000, test_RMSE: 1.1248109340667725, erank: 26.292514801
02539, s1: 6.8379340171813965, s5: 2.7065908908843994
depth: 1, iteration: 632000, test_RMSE: 1.1248012781143188, erank: 26.376590728
759766, s1: 6.8591837882995605, s5: 2.7200441360473633
depth: 1, iteration: 634000, test_RMSE: 1.1247917413711548, erank: 26.460336685
180664, s1: 6.880344867706299, s5: 2.7335891723632812
depth: 1, iteration: 636000, test_RMSE: 1.1247823238372803, erank: 26.543521881
103516, s1: 6.901592254638672, s5: 2.7470953464508057
depth: 1, iteration: 638000, test_RMSE: 1.1247729063034058, erank: 26.626489639
282227, s1: 6.9227142333984375, s5: 2.7605764865875244
depth: 1, iteration: 640000, test_RMSE: 1.1247636079788208, erank: 26.708986282
348633, s1: 6.943857669830322, s5: 2.774035930633545
depth: 1, iteration: 642000, test_RMSE: 1.1247544288635254, erank: 26.791254043
5791, s1: 6.964919567108154, s5: 2.787485361099243
depth: 1, iteration: 644000, test_RMSE: 1.1247451305389404, erank: 26.872928619
384766, s1: 6.986072540283203, s5: 2.8009872436523438
depth: 1, iteration: 646000, test_RMSE: 1.1247360706329346, erank: 26.954317092
895508, s1: 7.007143497467041, s5: 2.8144290447235107
depth: 1, iteration: 648000, test_RMSE: 1.1247268915176392, erank: 27.035179138
183594, s1: 7.028223514556885, s5: 2.827871084213257
depth: 1, iteration: 650000, test_RMSE: 1.1247178316116333, erank: 27.115774154
663086, s1: 7.049198150634766, s5: 2.8413171768188477
depth: 1, iteration: 652000, test_RMSE: 1.1247087717056274, erank: 27.196075439
453125, s1: 7.070096969604492, s5: 2.8547427654266357
depth: 1, iteration: 654000, test_RMSE: 1.1246998310089111, erank: 27.275770187
37793, s1: 7.091127395629883, s5: 2.8681812286376953
depth: 1, iteration: 656000, test_RMSE: 1.1246910095214844, erank: 27.355131149
291992, s1: 7.11205530166626, s5: 2.8815746307373047
depth: 1, iteration: 658000, test_RMSE: 1.1246821880340576, erank: 27.434103012
08496, s1: 7.132980823516846, s5: 2.8949732780456543
depth: 1, iteration: 660000, test_RMSE: 1.1246733665466309, erank: 27.512680053
710938, s1: 7.153851509094238, s5: 2.9084017276763916
depth: 1, iteration: 662000, test_RMSE: 1.124664545059204, erank: 27.5908222198
48633, s1: 7.174755096435547, s5: 2.9217891693115234
depth: 1, iteration: 664000, test_RMSE: 1.124655842781067, erank: 27.6686077117
91992, s1: 7.195571422576904, s5: 2.9351468086242676
depth: 1, iteration: 666000, test_RMSE: 1.1246472597122192, erank: 27.746023178
100586, s1: 7.216407775878906, s5: 2.9485363960266113
depth: 1, iteration: 668000, test_RMSE: 1.1246386766433716, erank: 27.823049545
288086, s1: 7.23723030090332, s5: 2.9619126319885254
depth: 1, iteration: 670000, test_RMSE: 1.124630093574524, erank: 27.8997268676

7578, s1: 7.257967948913574, s5: 2.9752535820007324
depth: 1, iteration: 672000, test_RMSE: 1.1246216297149658, erank: 27.975973129
27246, s1: 7.278792858123779, s5: 2.9886269569396973
depth: 1, iteration: 674000, test_RMSE: 1.1246131658554077, erank: 28.051898956
298828, s1: 7.299529552459717, s5: 3.0019609928131104
depth: 1, iteration: 676000, test_RMSE: 1.1246047019958496, erank: 28.127403259
277344, s1: 7.320297718048096, s5: 3.015293836593628
depth: 1, iteration: 678000, test_RMSE: 1.1245964765548706, erank: 28.202564239
501953, s1: 7.341007709503174, s5: 3.0286097526550293
depth: 1, iteration: 680000, test_RMSE: 1.124588131904602, erank: 28.2774028778
07617, s1: 7.361669540405273, s5: 3.0419294834136963
depth: 1, iteration: 682000, test_RMSE: 1.1245797872543335, erank: 28.351867675
78125, s1: 7.382347583770752, s5: 3.055239200592041
depth: 1, iteration: 684000, test_RMSE: 1.1245715618133545, erank: 28.426017761
23047, s1: 7.402942180633545, s5: 3.068544864654541
depth: 1, iteration: 686000, test_RMSE: 1.124563455581665, erank: 28.4998760223
38867, s1: 7.4235334396362305, s5: 3.0818052291870117
depth: 1, iteration: 688000, test_RMSE: 1.1245553493499756, erank: 28.573247909
5459, s1: 7.444179534912109, s5: 3.095132350921631
depth: 1, iteration: 690000, test_RMSE: 1.1245472431182861, erank: 28.646324157
714844, s1: 7.464696407318115, s5: 3.1083619594573975
depth: 1, iteration: 692000, test_RMSE: 1.1245392560958862, erank: 28.719062805
17578, s1: 7.485263347625732, s5: 3.1216440200805664
depth: 1, iteration: 694000, test_RMSE: 1.1245312690734863, erank: 28.791425704
956055, s1: 7.505812168121338, s5: 3.134882688522339
depth: 1, iteration: 696000, test_RMSE: 1.1245232820510864, erank: 28.863460540
771484, s1: 7.52631139755249, s5: 3.1481621265411377
depth: 1, iteration: 698000, test_RMSE: 1.124515414237976, erank: 28.9350624084
47266, s1: 7.546787738800049, s5: 3.161374092102051
depth: 1, iteration: 700000, test_RMSE: 1.1245075464248657, erank: 29.006332397
460938, s1: 7.567276954650879, s5: 3.1746222972869873
depth: 1, iteration: 702000, test_RMSE: 1.124499797821045, erank: 29.0772819519
04297, s1: 7.587682247161865, s5: 3.1878206729888916
depth: 1, iteration: 704000, test_RMSE: 1.1244920492172241, erank: 29.147893905
63965, s1: 7.608094215393066, s5: 3.201042413711548
depth: 1, iteration: 706000, test_RMSE: 1.1244843006134033, erank: 29.218097686
767578, s1: 7.628499507904053, s5: 3.2142550945281982
depth: 1, iteration: 708000, test_RMSE: 1.1244765520095825, erank: 29.287952423
095703, s1: 7.648880481719971, s5: 3.2274274826049805
depth: 1, iteration: 710000, test_RMSE: 1.1244689226150513, erank: 29.357507705
688477, s1: 7.669214248657227, s5: 3.240626335144043
depth: 1, iteration: 712000, test_RMSE: 1.1244614124298096, erank: 29.426635742
1875, s1: 7.689565658569336, s5: 3.2537784576416016
depth: 1, iteration: 714000, test_RMSE: 1.1244537830352783, erank: 29.495450973
510742, s1: 7.7098917961120605, s5: 3.2669525146484375
depth: 1, iteration: 716000, test_RMSE: 1.1244462728500366, erank: 29.563884735
107422, s1: 7.730221748352051, s5: 3.2800824642181396
depth: 1, iteration: 718000, test_RMSE: 1.124438762664795, erank: 29.6319618225
09766, s1: 7.750491619110107, s5: 3.2932262420654297
depth: 1, iteration: 720000, test_RMSE: 1.1244313716888428, erank: 29.699848175
048828, s1: 7.770692348480225, s5: 3.3063881397247314
depth: 1, iteration: 722000, test_RMSE: 1.1244239807128906, erank: 29.767290115
356445, s1: 7.7909135818481445, s5: 3.3195059299468994
depth: 1, iteration: 724000, test_RMSE: 1.1244165897369385, erank: 29.834512710

57129, s1: 7.811107158660889, s5: 3.3325788974761963
depth: 1, iteration: 726000, test_RMSE: 1.1244091987609863, erank: 29.901292800
90332, s1: 7.831305503845215, s5: 3.345696210861206
depth: 1, iteration: 728000, test_RMSE: 1.1244019269943237, erank: 29.967775344
848633, s1: 7.851471900939941, s5: 3.3587682247161865
depth: 1, iteration: 730000, test_RMSE: 1.1243947744369507, erank: 30.034015655
517578, s1: 7.871580123901367, s5: 3.3718626499176025
depth: 1, iteration: 732000, test_RMSE: 1.124387502670288, erank: 30.0998458862
3047, s1: 7.891739368438721, s5: 3.38493013381958
depth: 1, iteration: 734000, test_RMSE: 1.1243804693222046, erank: 30.165344238
28125, s1: 7.911874771118164, s5: 3.39798641204834
depth: 1, iteration: 736000, test_RMSE: 1.124373197555542, erank: 30.2306518554
6875, s1: 7.931849002838135, s5: 3.411025285720825
depth: 1, iteration: 738000, test_RMSE: 1.1243661642074585, erank: 30.295589447
021484, s1: 7.951859951019287, s5: 3.4240939617156982
depth: 1, iteration: 740000, test_RMSE: 1.124359130859375, erank: 30.3601093292
23633, s1: 7.97196626663208, s5: 3.4370968341827393
depth: 1, iteration: 742000, test_RMSE: 1.1243520975112915, erank: 30.424448013
305664, s1: 7.991983413696289, s5: 3.4501430988311768
depth: 1, iteration: 744000, test_RMSE: 1.124345064163208, erank: 30.4884643554
6875, s1: 8.011983871459961, s5: 3.463156223297119
depth: 1, iteration: 746000, test_RMSE: 1.124338150024414, erank: 30.5522212982
17773, s1: 8.031923294067383, s5: 3.4761440753936768
depth: 1, iteration: 748000, test_RMSE: 1.1243312358856201, erank: 30.615602493
286133, s1: 8.051898002624512, s5: 3.4891536235809326
depth: 1, iteration: 750000, test_RMSE: 1.1243243217468262, erank: 30.678798675
53711, s1: 8.071761131286621, s5: 3.5021004676818848
depth: 1, iteration: 752000, test_RMSE: 1.1243174076080322, erank: 30.741693496
7041, s1: 8.091611862182617, s5: 3.5150673389434814
depth: 1, iteration: 754000, test_RMSE: 1.1243107318878174, erank: 30.804151535
03418, s1: 8.111534118652344, s5: 3.528048276901245
depth: 1, iteration: 756000, test_RMSE: 1.1243038177490234, erank: 30.866443634
033203, s1: 8.131330490112305, s5: 3.5409841537475586
depth: 1, iteration: 758000, test_RMSE: 1.1242971420288086, erank: 30.928461074
8291, s1: 8.151130676269531, s5: 3.5539348125457764
depth: 1, iteration: 760000, test_RMSE: 1.1242903470993042, erank: 30.989940643
310547, s1: 8.171092987060547, s5: 3.566908836364746
depth: 1, iteration: 762000, test_RMSE: 1.124283790588379, erank: 31.0513858795
166, s1: 8.190755844116211, s5: 3.5798230171203613
depth: 1, iteration: 764000, test_RMSE: 1.124277114868164, erank: 31.1125221252
4414, s1: 8.210478782653809, s5: 3.5927107334136963
depth: 1, iteration: 766000, test_RMSE: 1.1242705583572388, erank: 31.173257827
75879, s1: 8.230199813842773, s5: 3.6056087017059326
depth: 1, iteration: 768000, test_RMSE: 1.1242640018463135, erank: 31.233762741
088867, s1: 8.249890327453613, s5: 3.6185178756713867
depth: 1, iteration: 770000, test_RMSE: 1.1242573261260986, erank: 31.293916702
270508, s1: 8.269614219665527, s5: 3.631394624710083
depth: 1, iteration: 772000, test_RMSE: 1.124250888824463, erank: 31.3537826538
08594, s1: 8.289316177368164, s5: 3.6442837715148926
depth: 1, iteration: 774000, test_RMSE: 1.1242444515228271, erank: 31.413463592
529297, s1: 8.308931350708008, s5: 3.6571481227874756
depth: 1, iteration: 776000, test_RMSE: 1.1242380142211914, erank: 31.472871780
395508, s1: 8.328526496887207, s5: 3.6699886322021484
depth: 1, iteration: 778000, test_RMSE: 1.1242315769195557, erank: 31.531944274

902344, s1: 8.348177909851074, s5: 3.6828339099884033
depth: 1, iteration: 780000, test_RMSE: 1.12422513961792, erank: 31.59074211120
6055, s1: 8.367720603942871, s5: 3.6956698894500732
depth: 1, iteration: 782000, test_RMSE: 1.1242188215255737, erank: 31.649229049
682617, s1: 8.387380599975586, s5: 3.7085185050964355
depth: 1, iteration: 784000, test_RMSE: 1.1242125034332275, erank: 31.707551956
176758, s1: 8.40687084197998, s5: 3.7213332653045654
depth: 1, iteration: 786000, test_RMSE: 1.1242061853408813, erank: 31.765510559
08203, s1: 8.426374435424805, s5: 3.734135627746582
depth: 1, iteration: 788000, test_RMSE: 1.1241999864578247, erank: 31.823259353
637695, s1: 8.445881843566895, s5: 3.7469441890716553
depth: 1, iteration: 790000, test_RMSE: 1.1241936683654785, erank: 31.880760192
871094, s1: 8.465350151062012, s5: 3.7597222328186035
depth: 1, iteration: 792000, test_RMSE: 1.1241875886917114, erank: 31.937906265
25879, s1: 8.484834671020508, s5: 3.772512435913086
depth: 1, iteration: 794000, test_RMSE: 1.1241813898086548, erank: 31.994773864
746094, s1: 8.504361152648926, s5: 3.7852842807769775
depth: 1, iteration: 796000, test_RMSE: 1.1241751909255981, erank: 32.051471710
20508, s1: 8.523698806762695, s5: 3.798025131225586
depth: 1, iteration: 798000, test_RMSE: 1.124169111251831, erank: 32.1078643798
8281, s1: 8.543113708496094, s5: 3.810781955718994

RUN: python /content/content/synth/main.py --method DLNN --data gaussian --N 10
0 --rank 5 --reg_norm ratio --initscale 1e-3 --sample_size 4000 --log_interval
2000 --depth 1 --lam 1e-2 --optim Adam --lr 1e-3 --niters 30000
depth: 1, iteration: 0, test_RMSE: 1.13348388671875, erank: 80.00656127929688,
s1: 0.01939358375966549, s5: 0.017589416354894638
depth: 1, iteration: 2000, test_RMSE: 1.1299279928207397, erank: 46.88607025146
4844, s1: 16.388713836669922, s5: 9.12843132019043
depth: 1, iteration: 4000, test_RMSE: 1.1373224258422852, erank: 45.13441085815
43, s1: 28.2651309967041, s5: 16.67180824279785
depth: 1, iteration: 6000, test_RMSE: 1.161454439163208, erank: 33.944564819335
94, s1: 35.33620834350586, s5: 20.86817741394043
depth: 1, iteration: 8000, test_RMSE: 1.2263013124465942, erank: 19.56339073181
1523, s1: 43.817752838134766, s5: 25.70183563232422
depth: 1, iteration: 10000, test_RMSE: 1.3281887769699097, erank: 8.02790737152
0996, s1: 53.35487365722656, s5: 31.196672439575195
depth: 1, iteration: 12000, test_RMSE: 1.3776334524154663, erank: 4.96543359756
4697, s1: 58.600799560546875, s5: 32.98215103149414
depth: 1, iteration: 14000, test_RMSE: 1.3782161474227905, erank: 4.92888116836
54785, s1: 58.694461822509766, s5: 32.99470901489258
depth: 1, iteration: 16000, test_RMSE: 1.3782130479812622, erank: 4.92755842208
8623, s1: 58.69486618041992, s5: 32.994720458984375
depth: 1, iteration: 18000, test_RMSE: 1.3782142400741577, erank: 4.92684078216
5527, s1: 58.69489669799805, s5: 32.99480056762695
depth: 1, iteration: 20000, test_RMSE: 1.37821364402771, erank: 4.9282484054565
43, s1: 58.69499969482422, s5: 32.99467468261719
depth: 1, iteration: 22000, test_RMSE: 1.3782159090042114, erank: 4.92764568328
8574, s1: 58.69506072998047, s5: 32.994667053222656
depth: 1, iteration: 24000, test_RMSE: 1.3782117366790771, erank: 4.92663574218
75, s1: 58.69490432739258, s5: 32.99445724487305
depth: 1, iteration: 26000, test_RMSE: 1.3782117366790771, erank: 4.92775011062
6221, s1: 58.694923400878906, s5: 32.9947509765625
depth: 1, iteration: 28000, test_RMSE: 1.3782142400741577, erank: 4.92595005035

```
        4004, s1: 58.69485855102539, s5: 32.99483108520508
```

In [11]:
```python
#Fetch ML-100k (safe no-op if present)
import os, urllib.request, zipfile, io, pathlib
ML_DIR = "/content/ml-100k"
if not os.path.exists(f"{ML_DIR}/u.data"):
    print("Downloading MovieLens 100k …")
    data = urllib.request.urlopen("https://files.grouplens.org/datasets/moviel
    zipfile.ZipFile(io.BytesIO(data)).extractall("/content")
    assert os.path.exists(f"{ML_DIR}/u.data"), "MovieLens 100k not found after
print("✔ MovieLens ready.")

BASE_ML = dict(
    method="DLNN",
    data="ml-100k-sample",
    depth=1,
    optim="Adam",
    lr="5e-4", #working LR
    trainprop="0.8",
    reg_norm="ratio",
    initscale="1e-3",
    log_interval=1000
)

#λ = 0 vs 1e-3
run_and_log("ML_lam0_adam_long",    **BASE_ML, lam="0.0",  niters=40_000)
run_and_log("ML_lam1e-3_adam_long", **BASE_ML, lam="1e-3", niters=40_000)
```

✔ MovieLens ready.
RUN: python /content/content/synth/main.py --method DLNN --data ml-100k-sample --depth 1 --optim Adam --lr 5e-4 --trainprop 0.8 --reg_norm ratio --initscale 1e-3 --log_interval 1000 --lam 0.0 --niters 40000
depth: 1, iteration: 0, test_RMSE: 3.7128684520721436, erank: 675.819091796875, s1: 0.06876151263713837, s5: 0.016600891947746277
depth: 1, iteration: 1000, test_RMSE: 3.7128684520721436, erank: 624.34716796875, s1: 66.41107940673828, s5: 15.898189544677734
depth: 1, iteration: 2000, test_RMSE: 3.7128684520721436, erank: 623.4058837890625, s1: 128.39491271972656, s5: 30.638225555419922
depth: 1, iteration: 3000, test_RMSE: 3.7128684520721436, erank: 622.2479248046875, s1: 186.6156463623047, s5: 44.45459747314453
depth: 1, iteration: 4000, test_RMSE: 3.7128684520721436, erank: 620.95654296875, s1: 241.38926696777344, s5: 57.60871505737305
depth: 1, iteration: 5000, test_RMSE: 3.7128684520721436, erank: 619.6657104492188, s1: 292.7303466796875, s5: 70.26631927490234
depth: 1, iteration: 6000, test_RMSE: 3.7128684520721436, erank: 618.3209228515625, s1: 340.2009582519531, s5: 82.28085327148438
depth: 1, iteration: 7000, test_RMSE: 3.7128684520721436, erank: 616.8640747070312, s1: 383.0242919921875, s5: 93.44588470458984
depth: 1, iteration: 8000, test_RMSE: 3.7128684520721436, erank: 615.3244018554688, s1: 420.49591064453125, s5: 103.4920425415039
depth: 1, iteration: 9000, test_RMSE: 3.7128684520721436, erank: 613.7203979492188, s1: 451.6007995605469, s5: 112.14539337158203
depth: 1, iteration: 10000, test_RMSE: 3.7128684520721436, erank: 612.1141357421875, s1: 475.905517578125, s5: 119.18619537353516
depth: 1, iteration: 11000, test_RMSE: 3.7128684520721436, erank: 610.7039184570312, s1: 493.3720703125, s5: 124.4432144165039
depth: 1, iteration: 12000, test_RMSE: 3.7128684520721436, erank: 609.5949096679688, s1: 504.42529296875, s5: 127.88113403320312
depth: 1, iteration: 13000, test_RMSE: 3.7128684520721436, erank: 608.8793334960938, s1: 510.3301696777344, s5: 129.77371215820312
depth: 1, iteration: 14000, test_RMSE: 3.7128684520721436, erank: 608.5762939453125, s1: 512.682373046875, s5: 130.48085021972656
depth: 1, iteration: 15000, test_RMSE: 3.7128684520721436, erank: 608.5162963867188, s1: 513.135498046875, s5: 130.628662109375
depth: 1, iteration: 16000, test_RMSE: 3.7128684520721436, erank: 608.5159912109375, s1: 513.149169921875, s5: 130.62303161621094
depth: 1, iteration: 17000, test_RMSE: 3.7128684520721436, erank: 608.5148315429688, s1: 513.1483154296875, s5: 130.63018798828125
depth: 1, iteration: 18000, test_RMSE: 3.7128684520721436, erank: 608.5130615234375, s1: 513.15771484375, s5: 130.63551330566406
depth: 1, iteration: 19000, test_RMSE: 3.7128684520721436, erank: 608.51513671875, s1: 513.14453125, s5: 130.63031005859375
depth: 1, iteration: 20000, test_RMSE: 3.7128684520721436, erank: 608.5148315429688, s1: 513.154541015625, s5: 130.6268768310547
depth: 1, iteration: 21000, test_RMSE: 3.7128684520721436, erank: 608.51513671875, s1: 513.1485595703125, s5: 130.62176513671875
depth: 1, iteration: 22000, test_RMSE: 3.7128684520721436, erank: 608.5145263671875, s1: 513.148681640625, s5: 130.63217163085938
depth: 1, iteration: 23000, test_RMSE: 3.7128684520721436, erank: 608.5139770507812, s1: 513.1553955078125, s5: 130.6310272216797
depth: 1, iteration: 24000, test_RMSE: 3.7128684520721436, erank: 608.5162963867188, s1: 513.1419067382812, s5: 130.6134033203125

```
depth: 1, iteration: 25000, test_RMSE: 3.7128684520721436, erank: 608.516296386
7188, s1: 513.1419067382812, s5: 130.6134033203125
depth: 1, iteration: 26000, test_RMSE: 3.7128684520721436, erank: 608.515380859
375, s1: 513.1487426757812, s5: 130.61676025390625
depth: 1, iteration: 27000, test_RMSE: 3.7128684520721436, erank: 608.515380859
375, s1: 513.1487426757812, s5: 130.61676025390625
depth: 1, iteration: 28000, test_RMSE: 3.7128684520721436, erank: 608.515380859
375, s1: 513.1487426757812, s5: 130.61676025390625
depth: 1, iteration: 29000, test_RMSE: 3.7128684520721436, erank: 608.515380859
375, s1: 513.1487426757812, s5: 130.61676025390625
depth: 1, iteration: 30000, test_RMSE: 3.7128684520721436, erank: 608.515380859
375, s1: 513.1487426757812, s5: 130.61676025390625
depth: 1, iteration: 31000, test_RMSE: 3.7128684520721436, erank: 608.515380859
375, s1: 513.1487426757812, s5: 130.61676025390625
depth: 1, iteration: 32000, test_RMSE: 3.7128684520721436, erank: 608.515380859
375, s1: 513.1487426757812, s5: 130.61676025390625
depth: 1, iteration: 33000, test_RMSE: 3.7128684520721436, erank: 608.515380859
375, s1: 513.1487426757812, s5: 130.61676025390625
depth: 1, iteration: 34000, test_RMSE: 3.7128684520721436, erank: 608.515380859
375, s1: 513.1487426757812, s5: 130.61676025390625
depth: 1, iteration: 35000, test_RMSE: 3.7128684520721436, erank: 608.515380859
375, s1: 513.1487426757812, s5: 130.61676025390625
depth: 1, iteration: 36000, test_RMSE: 3.7128684520721436, erank: 608.515380859
375, s1: 513.1487426757812, s5: 130.61676025390625
depth: 1, iteration: 37000, test_RMSE: 3.7128684520721436, erank: 608.515380859
375, s1: 513.1487426757812, s5: 130.61676025390625
depth: 1, iteration: 38000, test_RMSE: 3.7128684520721436, erank: 608.515380859
375, s1: 513.1487426757812, s5: 130.61676025390625
depth: 1, iteration: 39000, test_RMSE: 3.7128684520721436, erank: 608.515380859
375, s1: 513.1487426757812, s5: 130.61676025390625

RUN: python /content/content/synth/main.py --method DLNN --data ml-100k-sample
--depth 1 --optim Adam --lr 5e-4 --trainprop 0.8 --reg_norm ratio --initscale 1
e-3 --log_interval 1000 --lam 1e-3 --niters 40000
depth: 1, iteration: 0, test_RMSE: 3.703817844390869, erank: 840.7400512695312,
s1: 0.03829774633049965, s5: 0.03754178434610367
depth: 1, iteration: 1000, test_RMSE: 3.6616404056549072, erank: 492.5755920410
156, s1: 74.02537536621094, s5: 16.605382919311523
depth: 1, iteration: 2000, test_RMSE: 3.6343634128570557, erank: 501.3257446289
0625, s1: 141.9091339111328, s5: 32.128509521484375
depth: 1, iteration: 3000, test_RMSE: 3.6053998470306396, erank: 498.4325256347
656, s1: 206.66629028320312, s5: 46.96464538574219
depth: 1, iteration: 4000, test_RMSE: 3.570697069168091, erank: 490.08843994140
625, s1: 269.34124755859375, s5: 61.4050407409668
depth: 1, iteration: 5000, test_RMSE: 3.526705741882324, erank: 477.32183837890
625, s1: 330.79205322265625, s5: 75.61666107177734
depth: 1, iteration: 6000, test_RMSE: 3.46940279006958, erank: 460.182556152343
75, s1: 391.6394958496094, s5: 89.64967346191406
depth: 1, iteration: 7000, test_RMSE: 3.3942551612854004, erank: 438.4794616699
219, s1: 452.3440856933594, s5: 103.4718017578125
depth: 1, iteration: 8000, test_RMSE: 3.296700954437256, erank: 412.20001220703
125, s1: 513.6458740234375, s5: 117.08761596679688
depth: 1, iteration: 9000, test_RMSE: 3.1729817390441895, erank: 381.8204956054
6875, s1: 576.2074584960938, s5: 130.39138793945312
```

depth: 1, iteration: 10000, test_RMSE: 3.0217719078063965, erank: 348.213775634
7656, s1: 640.8767700195312, s5: 143.31698608398438
depth: 1, iteration: 11000, test_RMSE: 2.845634698867798, erank: 313.0323181152
344, s1: 708.5931396484375, s5: 155.6799774169922
depth: 1, iteration: 12000, test_RMSE: 2.6520071029663086, erank: 277.972595214
84375, s1: 779.4852905273438, s5: 167.2338409423828
depth: 1, iteration: 13000, test_RMSE: 2.4524598121643066, erank: 245.481033325
1953, s1: 853.2654418945312, s5: 177.8187713623047
depth: 1, iteration: 14000, test_RMSE: 2.2591652870178223, erank: 216.710433959
96094, s1: 928.4568481445312, s5: 187.3521728515625
depth: 1, iteration: 15000, test_RMSE: 2.080876350402832, erank: 192.0294952392
578, s1: 1003.4403076171875, s5: 195.9173583984375
depth: 1, iteration: 16000, test_RMSE: 1.9225038290023804, erank: 171.614852905
27344, s1: 1076.968505859375, s5: 203.76495361328125
depth: 1, iteration: 17000, test_RMSE: 1.7855792045593262, erank: 155.024307250
97656, s1: 1147.9334716796875, s5: 211.02337646484375
depth: 1, iteration: 18000, test_RMSE: 1.6695261001586914, erank: 141.253585815
4297, s1: 1215.63623046875, s5: 217.72378540039062
depth: 1, iteration: 19000, test_RMSE: 1.5726906061172485, erank: 129.880065917
96875, s1: 1279.745361328125, s5: 223.91879272460938
depth: 1, iteration: 20000, test_RMSE: 1.4926356077194214, erank: 120.296722412
10938, s1: 1340.2816162109375, s5: 229.6568603515625
depth: 1, iteration: 21000, test_RMSE: 1.4266560077667236, erank: 112.251380920
41016, s1: 1397.35546875, s5: 234.92999267578125
depth: 1, iteration: 22000, test_RMSE: 1.372292160987854, erank: 105.4084854125
9766, s1: 1451.09033203125, s5: 239.8048858642578
depth: 1, iteration: 23000, test_RMSE: 1.3272801637649536, erank: 99.5703964233
3984, s1: 1501.8026123046875, s5: 244.26324462890625
depth: 1, iteration: 24000, test_RMSE: 1.2897531986236572, erank: 94.5331573486
3281, s1: 1549.7491455078125, s5: 248.3368682861328
depth: 1, iteration: 25000, test_RMSE: 1.258226752281189, erank: 90.15553283691
406, s1: 1595.070068359375, s5: 252.0679931640625
depth: 1, iteration: 26000, test_RMSE: 1.2315638065338135, erank: 86.2925872802
7344, s1: 1638.126708984375, s5: 255.44839477539062
depth: 1, iteration: 27000, test_RMSE: 1.2088348865509033, erank: 82.8650131225
586, s1: 1679.1505126953125, s5: 258.4791564941406
depth: 1, iteration: 28000, test_RMSE: 1.189306378364563, erank: 79.80447387695
312, s1: 1718.36767578125, s5: 261.26483154296875
depth: 1, iteration: 29000, test_RMSE: 1.1723880767822266, erank: 77.0820236206
0547, s1: 1755.8427734375, s5: 263.7091369628906
depth: 1, iteration: 30000, test_RMSE: 1.1576611995697021, erank: 74.6286773681
6406, s1: 1791.6536865234375, s5: 265.8998718261719
depth: 1, iteration: 31000, test_RMSE: 1.1447525024414062, erank: 72.4118270874
0234, s1: 1826.0137939453125, s5: 267.876708984375
depth: 1, iteration: 32000, test_RMSE: 1.1333683729171753, erank: 70.4046020507
8125, s1: 1858.9561767578125, s5: 269.5861511230469
depth: 1, iteration: 33000, test_RMSE: 1.1232737302780151, erank: 68.5699691772
461, s1: 1890.73583984375, s5: 271.0729675292969
depth: 1, iteration: 34000, test_RMSE: 1.1142817735671997, erank: 66.8831863403
3203, s1: 1921.355712890625, s5: 272.3211364746094
depth: 1, iteration: 35000, test_RMSE: 1.1062278747558594, erank: 65.3292312622
0703, s1: 1950.9256591796875, s5: 273.40380859375
depth: 1, iteration: 36000, test_RMSE: 1.0989837646484375, erank: 63.8948631286
6211, s1: 1979.4732666015625, s5: 274.29205322265625

```
depth: 1, iteration: 37000, test_RMSE: 1.0924348831176758, erank: 62.5656661987
3047, s1: 2007.2017822265625, s5: 274.9951171875
depth: 1, iteration: 38000, test_RMSE: 1.0864828824996948, erank: 61.3332443237
3047, s1: 2034.19775390625, s5: 275.5694274902344
depth: 1, iteration: 39000, test_RMSE: 1.081064224243164, erank: 60.19676208496
094, s1: 2059.987060546875, s5: 276.0526123046875
```

In [12]:
```python
import os, re, glob, pandas as pd, numpy as np

LOG_GLOBS = [os.path.join(LOGDIR, "*.log")]
files = sorted({p for g in LOG_GLOBS for p in glob.glob(g)})

pat = re.compile(
    r"depth:\s*(\d+).*?iteration:\s*(\d+).*?"
    r"test_RMSE:\s*([\-0-9\.Ee\+]+).*?erank:\s*([\-0-9\.Ee\+]+).*?"
    r"s1:\s*([\-0-9\.Ee\+]+).*?s5:\s*([\-0-9\.Ee\+]+)"
)

def infer_opt(name):
    n = name.lower()
    if "adam" in n: return "adam"
    if "gd"   in n: return "gd"
    return "unk"

rows = []
for path in files:
    with open(path, "r", errors="ignore") as f:
        for line in f:
            m = pat.search(line)
            if not m: continue
            d,it,rmse,er,s1,s5 = m.groups()
            rows.append(dict(
                file=os.path.basename(path),
                optimizer=infer_opt(path),
                depth=int(d),
                iteration=int(it),
                test_RMSE=float(rmse),
                erank=float(er),
                s1=float(s1),
                s5=float(s5),
            ))

df = pd.DataFrame(rows).sort_values(["optimizer","depth","iteration"]).reset_i
print(f"Parsed {len(df)} rows from {len(files)} log files.")
if df.empty:
    raise RuntimeError("No rows parsed — make sure runs completed and s1/s5 ar
df.tail(10)
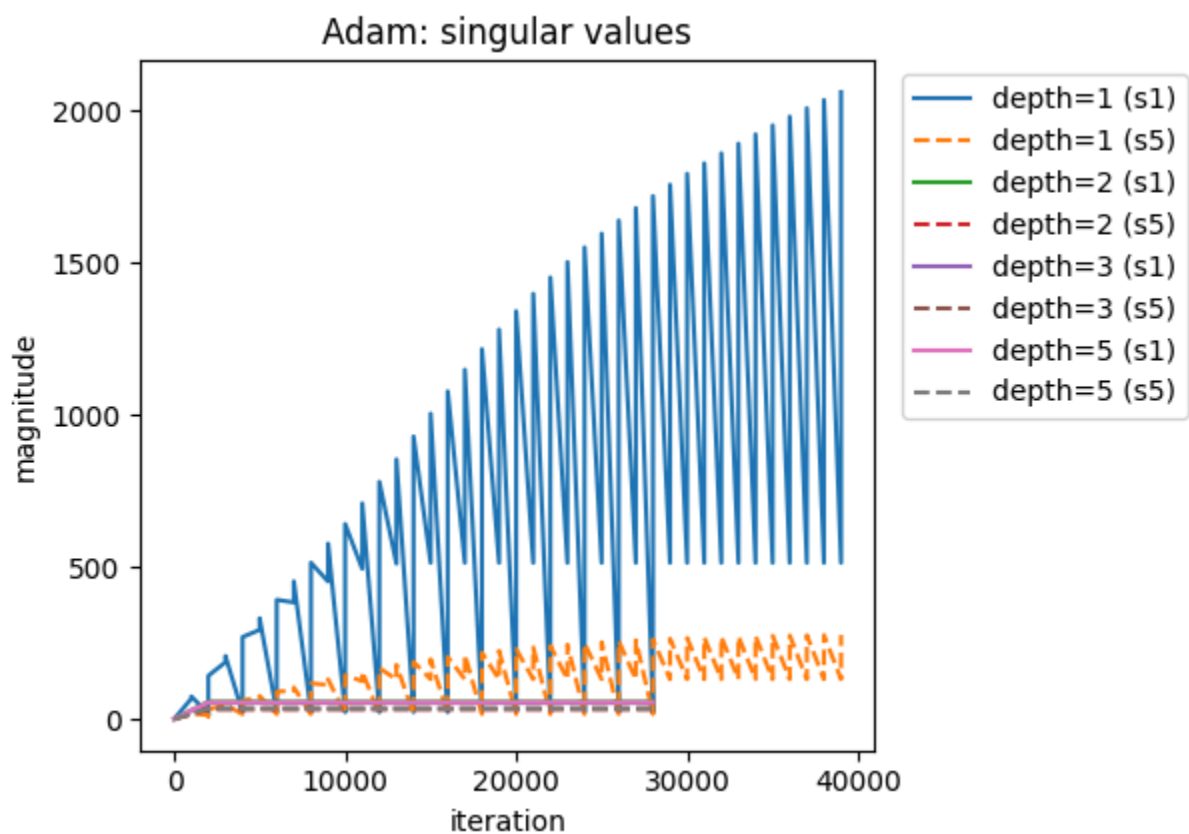```
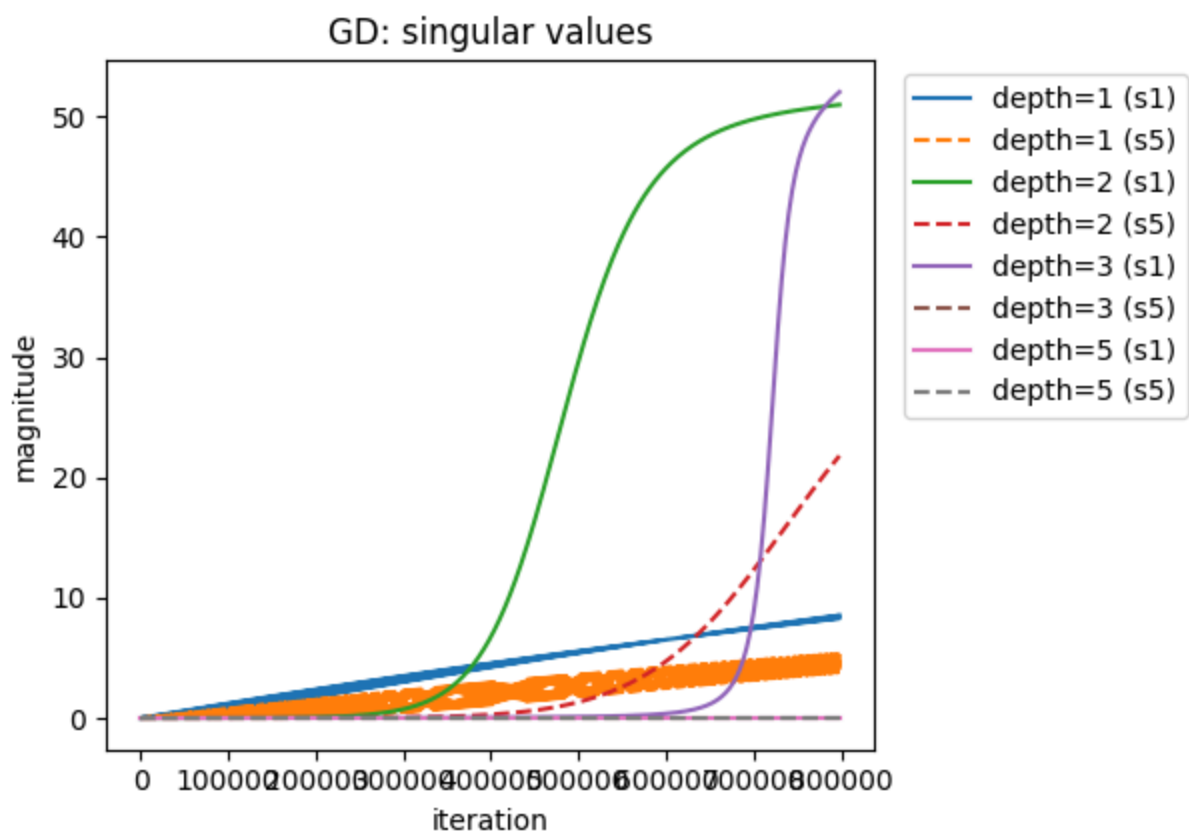
```
Parsed 2155 rows from 12 log files.
```

| | file | optimizer | depth | iteration | test_RMSE | erank | |
|---|---|---|---|---|---|---|---|
| **2145** | F1_gd_d5_lam0.log | gd | 5 | 780000 | 1.119042 | 41.754005 | 0.004 |
| **2146** | F1_gd_d5_lam0.log | gd | 5 | 782000 | 1.119042 | 41.739948 | 0.004 |
| **2147** | F1_gd_d5_lam0.log | gd | 5 | 784000 | 1.119042 | 41.725899 | 0.004 |
| **2148** | F1_gd_d5_lam0.log | gd | 5 | 786000 | 1.119042 | 41.711735 | 0.004 |
| **2149** | F1_gd_d5_lam0.log | gd | 5 | 788000 | 1.119042 | 41.697536 | 0.004 |
| **2150** | F1_gd_d5_lam0.log | gd | 5 | 790000 | 1.119042 | 41.683300 | 0.004 |
| **2151** | F1_gd_d5_lam0.log | gd | 5 | 792000 | 1.119042 | 41.669014 | 0.004 |
| **2152** | F1_gd_d5_lam0.log | gd | 5 | 794000 | 1.119042 | 41.654690 | 0.004 |
| **2153** | F1_gd_d5_lam0.log | gd | 5 | 796000 | 1.119042 | 41.640285 | 0.004 |
| **2154** | F1_gd_d5_lam0.log | gd | 5 | 798000 | 1.119042 | 41.625851 | 0.004 |

In [13]:
```python
import matplotlib.pyplot as plt

def plot_sv_panel(opt_name, title):
    sub = df[df["optimizer"]==opt_name]
    if sub.empty: return
    plt.figure(figsize=(6.2,4.4))
    for d in sorted(sub["depth"].unique()):
        cur = sub[sub["depth"]==d]
        if cur.empty: continue
        plt.plot(cur["iteration"], cur["s1"], label=f"depth={d} (s1)")
        plt.plot(cur["iteration"], cur["s5"], linestyle="--", label=f"depth={d
    plt.title(title); plt.xlabel("iteration"); plt.ylabel("magnitude")
    plt.legend(bbox_to_anchor=(1.02,1), loc="upper left"); plt.tight_layout();

plot_sv_panel("gd",   "GD: singular values")
plot_sv_panel("adam", "Adam: singular values")
```

GD: singular values

Legend:
- depth=1 (s1)
- depth=1 (s5)
- depth=2 (s1)
- depth=2 (s5)
- depth=3 (s1)
- depth=3 (s5)
- depth=5 (s1)
- depth=5 (s5)

Adam: singular values

Legend:
- depth=1 (s1)
- depth=1 (s5)
- depth=2 (s1)
- depth=2 (s5)
- depth=3 (s1)
- depth=3 (s5)
- depth=5 (s1)
- depth=5 (s5)

```python
In [14]: def plot_metric(metric, title):
             plt.figure(figsize=(6.6,4.4))
```
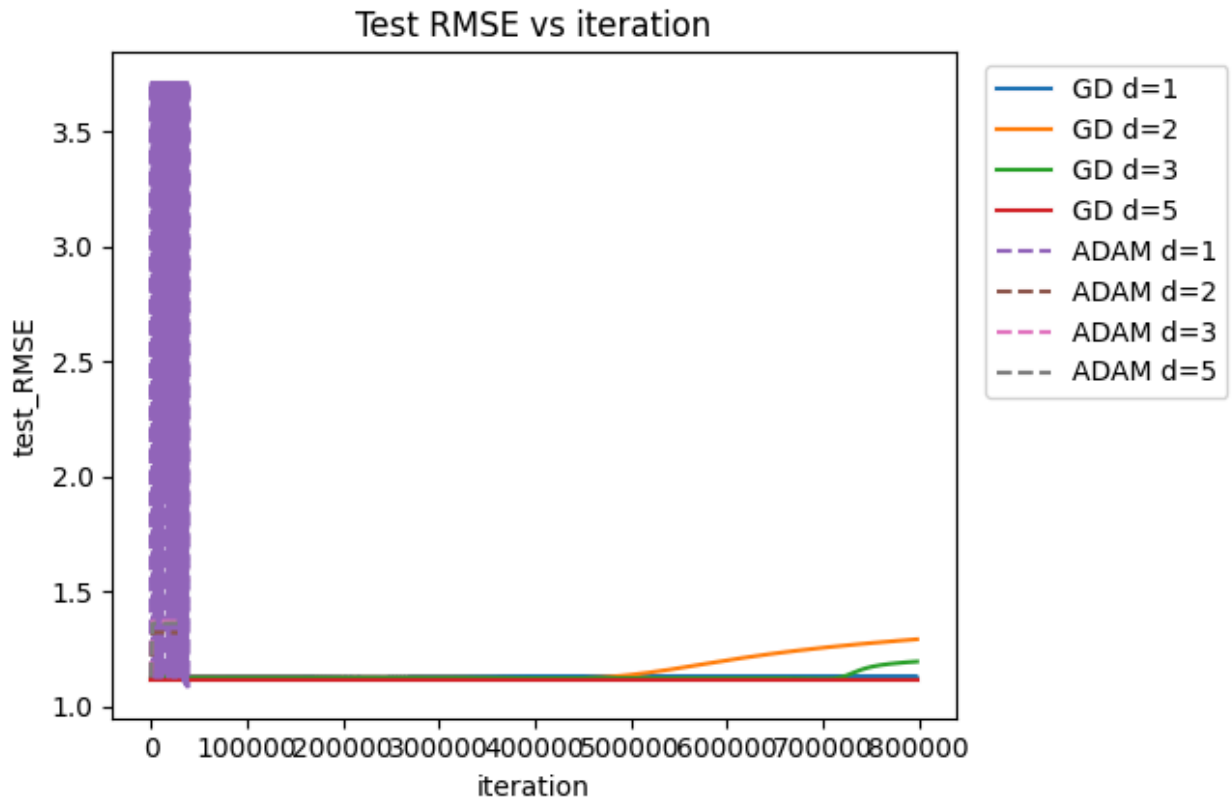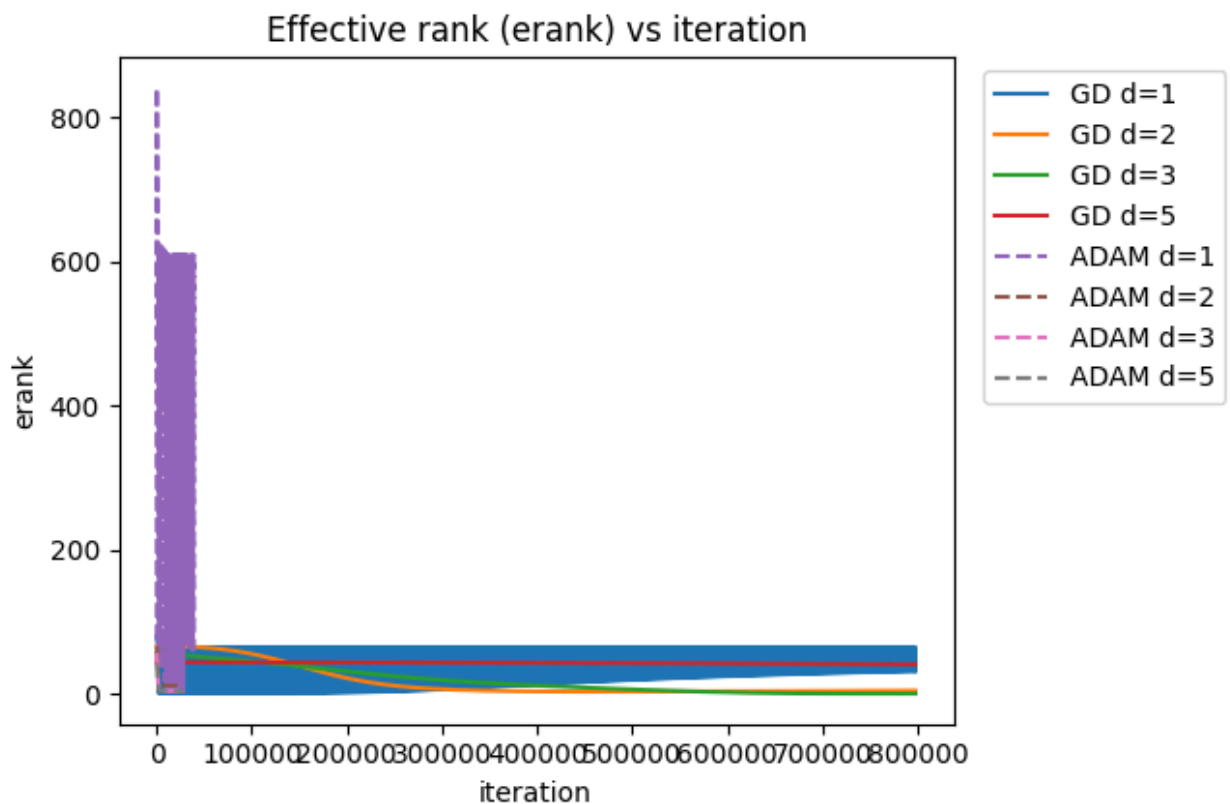
```
    for opt in ("gd","adam"):
        for d in sorted(df["depth"].unique()):
            cur = df[(df.optimizer==opt) & (df.depth==d)]
            if cur.empty: continue
            ls = "-" if opt=="gd" else "--"
            plt.plot(cur["iteration"], cur[metric], ls, label=f"{opt.upper()}
    plt.xlabel("iteration"); plt.ylabel(metric); plt.title(title)
    plt.legend(bbox_to_anchor=(1.02,1), loc="upper left"); plt.tight_layout();

plot_metric("test_RMSE", "Test RMSE vs iteration")
plot_metric("erank",     "Effective rank (erank) vs iteration")
```


Test RMSE vs iteration

Effective rank (erank) vs iteration

Legend:
- GD d=1
- GD d=2
- GD d=3
- GD d=5
- ADAM d=1
- ADAM d=2
- ADAM d=3
- ADAM d=5

In [15]:
```python
ml = df[df["file"].str.contains("ML_", na=False)]
assert not ml.empty, "No MovieLens rows parsed. Run Cell 6 first."

#Extract λ from filename for labeling
def lab(name):
    return "λ=1e-3" if "lam1e-3" in name else "λ=0"

def plot_ml(metric, title):
    plt.figure(figsize=(6.6,4.4))
    for key, g in ml.groupby("file"):
        g = g.sort_values("iteration")
        plt.plot(g["iteration"], g[metric], "--", label=f"Adam d=1, {lab(key)}
    plt.xlabel("iteration"); plt.ylabel(metric); plt.title(title)
    plt.legend(); plt.tight_layout(); plt.show()

plot_ml("test_RMSE", "MovieLens: test_RMSE")
plot_ml("erank",     "MovieLens: erank")

#summary table
last = (ml.sort_values(["file","iteration"])
          .groupby("file").tail(1)
          [["file","iteration","test_RMSE","erank","s1","s5"]])
print("=== MovieLens last metrics ===")
print(last.to_string(index=False))
```
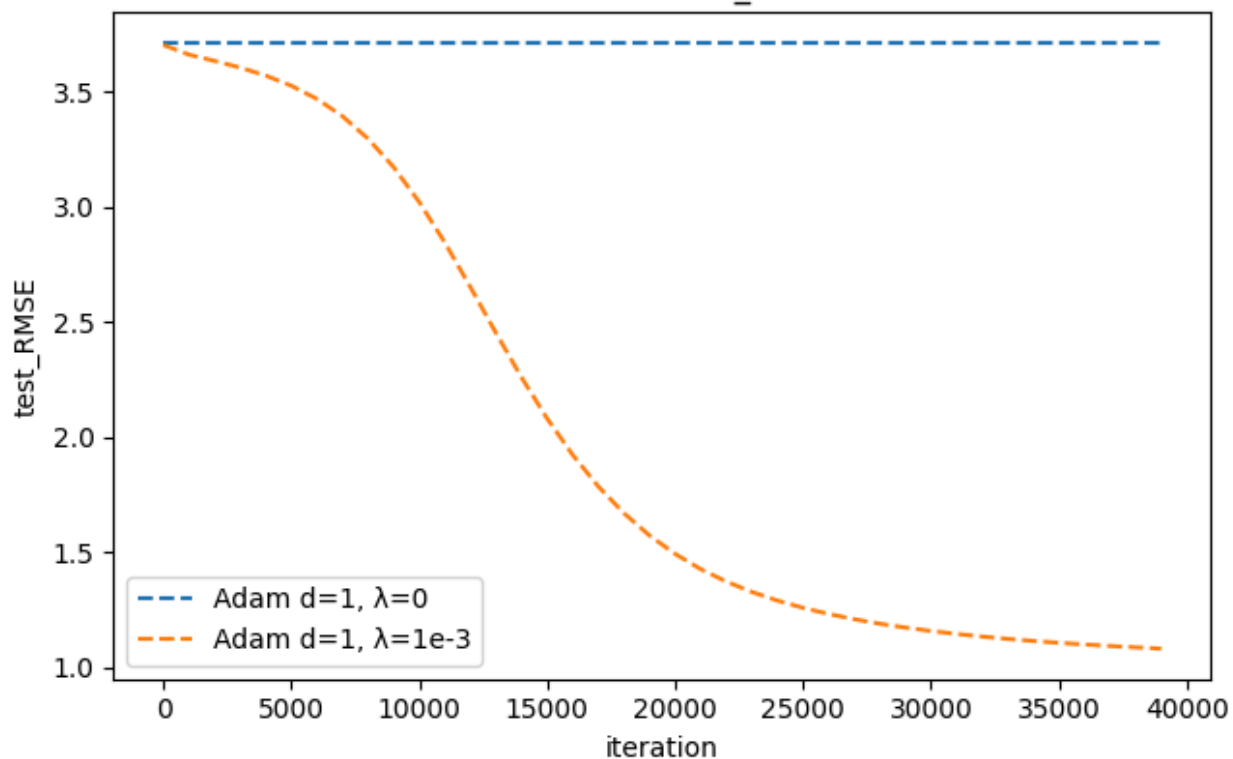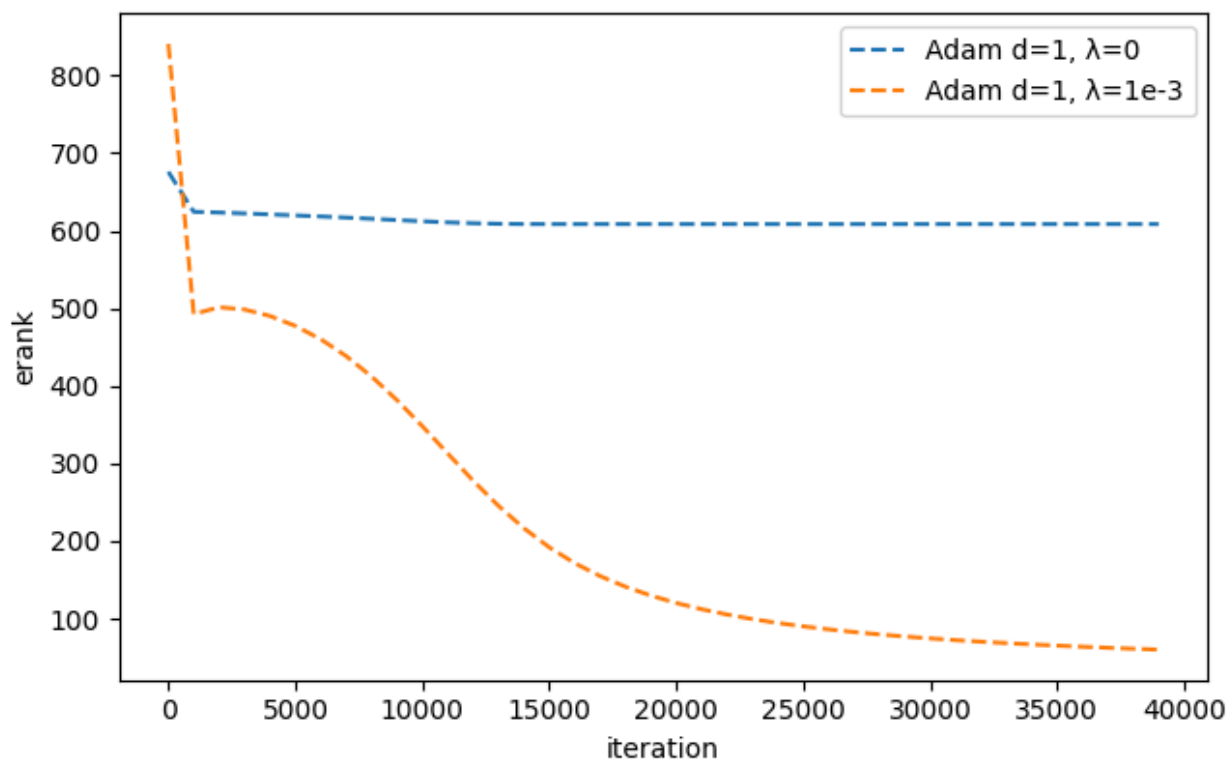
MovieLens: test_RMSE

MovieLens: erank

```
=== MovieLens last metrics ===
                        file  iteration  test_RMSE       erank          s1          s
5
    ML_lam0_adam_long.log      39000   3.712868 608.515381  513.148743 130.61676
0
ML_lam1e-3_adam_long.log      39000   1.081064  60.196762 2059.987061 276.05261
2
```

In [16]:
```python
last_syn = (df[~df["file"].str.contains("ML_", na=False)]
              .sort_values(["optimizer","depth","iteration"])
              .groupby(["optimizer","depth"]).tail(1)
              [["optimizer","depth","iteration","test_RMSE","erank","s1","s5"]
print("=== Last metrics (synthetic, per optimizer & depth) ===")
print(last_syn.to_string(index=False))
```

```
=== Last metrics (synthetic, per optimizer & depth) ===
optimizer  depth  iteration  test_RMSE      erank         s1         s5
    adam      1      28000   1.378214   4.925950  58.694859  32.994831
    adam      2      28000   1.320843  12.232730  56.482361  31.388840
    adam      3      28000   1.370288   4.952991  52.757309  35.784588
    adam      5      28000   1.362176   4.940028  55.214802  33.268047
      gd      1     798000   1.124169  32.107864   8.543114   3.810782
      gd      2     798000   1.292061   5.181543  50.956833  21.791687
      gd      3     798000   1.195019   1.039811  52.019512   0.008127
      gd      5     798000   1.119042  41.625851   0.004569   0.002813
```