

Litter Size Evolution

Data: 1006 out of 2278 species (all species within Rodentia that I have data for) Plotted: 819 species are phylogenetically resolved, thus plotted here Consensus tree extracted from an Upham et al. paper (Jetz lab)

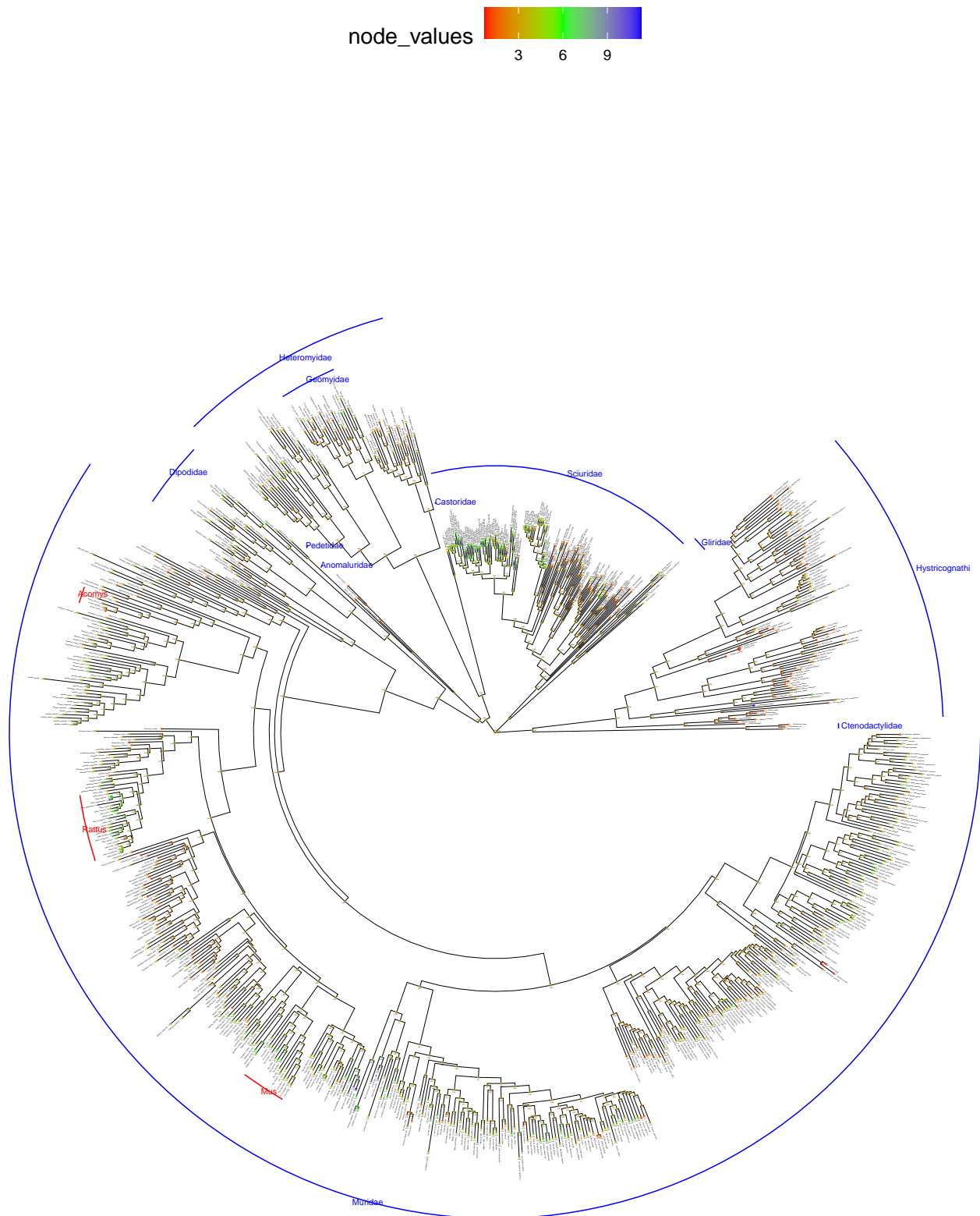
This version includes all families and all species that I can find. I labeled suprafamilies and a few common families (Acomys, Mus, Rattus).

The labeling are based on this paper. There is a minor taxonomy conflict, the relationship between Heteromyidae and Geomyidae outlined by the paper is different from this tree I used. I am leaning towards the tree, as it was published in 2019, time calibrated and used 31 genes instead of 2 to construct.

Method: REML, metadata attached at the end. The confidence interval is quite wide. One of the Brownian motion parameter is Nah, and I am still trying to figure out what that means.

Thoughts: The earlier ancestors all have average litter size of 2.88 or 2.89, and then evolve either into higher or smaller litter size. There are a few outliers, such as *Heterocephalus glaber*, which has a litter size of 11.3, among species with litter size of 3. I am not sure how this reconstruction can disqualify the hypothesis that smaller litter size is the driving force. Would love to discuss.

Warning in sqrt(1/out\$hessian): NaNs produced



Metadata about this reconstruction:

- σ^2 is the estimate of the Brownian Motion parameter.
- CI95 are the confidence intervals on the ancestral character state reconstructions.

Residual log-likelihood: -5664.2874262

Sigma2: 997.3621519, NaN

CI95:

	lower bound	upper bound
820	-11.1706288	16.942259
821	-11.0757624	16.847165
822	-14.5425074	20.307337
823	-11.5778197	17.328727
824	-10.4828077	16.261825
825	-9.1689329	14.914383
826	-9.0507596	14.727896
827	-7.6366927	11.102322
828	-1.4649762	3.070575
829	-9.6714865	15.420109
830	-9.3610873	14.921793
831	-9.0066873	14.492783
832	-6.2275702	11.130951
833	-5.3459899	7.571951
834	-3.4526487	7.944607
835	-9.1783995	14.989226
836	-8.4532892	14.221426
837	-8.8973568	14.630967
838	-5.2074702	11.175281
839	-4.0995015	11.175074
840	-4.0734155	10.532172
841	-3.0608162	8.707886
842	-1.7609680	7.864762
843	-1.1770727	7.724319
844	-0.5542680	6.826889
845	0.4252193	5.818392
846	-5.8595078	11.489502
847	-4.9073381	10.485066
848	-4.3949339	10.094413
849	-5.4572151	11.225995
850	-4.8671684	10.322574
851	-4.8869380	10.295983
852	-4.4908476	10.015464
853	-4.8460641	10.429928
854	2.9377652	3.061728
855	-4.6463136	10.119599
856	-4.4404691	10.128989
857	-6.3806698	12.687395
858	-5.5052949	10.040981
859	-4.7733167	10.307515
860	-5.2362026	10.686441
861	-7.1551842	12.318573
862	-6.3181528	11.534203
863	-7.1126428	11.799676
864	-5.4945246	10.952444
865	-6.3406269	11.915198
866	-6.7029090	11.594022
867	-6.5699568	10.934812

	lower bound	upper bound
868	-5.9979480	11.479874
869	-5.9276028	11.151905
870	-6.2969426	11.885648
871	-6.8493502	11.890780
872	-5.5603443	10.360176
873	-4.0073040	6.907819
874	-3.9150630	8.211816
875	-3.7652141	7.824161
876	-7.0846394	14.016890
877	-9.7903652	15.421301
878	-6.1007694	8.387490
879	-9.5642746	15.293073
880	-6.4778311	11.594317
881	-5.0835704	9.439547
882	-4.1447118	7.741421
883	-4.0159398	7.878415
884	-7.3529142	13.101475
885	-7.0444810	12.648545
886	-7.2926571	12.131291
887	-7.5962888	13.125112
888	-7.5656457	13.309020
889	-8.0657836	13.719562
890	-5.8074391	11.718307
891	-5.8635752	9.917396
892	-3.5769700	8.197743
893	-3.0357370	7.919222
894	-2.0038858	7.306060
895	-9.1980289	14.621510
896	-11.2777464	17.225369
897	-14.8159248	20.516302
898	-10.6640926	18.126849
899	-8.1757227	13.950910
900	-6.6049138	12.510562
901	-6.3040535	12.726151
902	-1.4039791	7.413106
903	-6.6989987	12.352800
904	-5.1509751	10.813102
905	-10.3310108	15.510943
906	-5.8655888	10.607412
907	-5.5674863	10.090645
908	-4.1349950	7.538543
909	-4.4371674	7.869716
910	-3.5189033	6.948729
911	-9.5661912	14.717613
912	-3.5989310	7.371954
913	-11.3019834	17.071824
914	-9.9286363	15.822340
915	-9.8367463	16.386306
916	-9.9304867	15.775881
917	-10.3016668	16.360252
918	-9.2509379	15.469947
919	-1.3848109	11.482767

	lower bound	upper bound
920	-5.4659110	12.091781
921	-9.4265237	15.142641
922	-7.4476441	13.196362
923	-6.8587424	12.556678
924	-5.5257334	11.280428
925	-6.0535175	11.875159
926	-5.3640279	11.115820
927	-5.0683891	10.899827
928	-5.3787939	11.318054
929	-2.7078357	8.886815
930	-4.9855447	10.399591
931	-4.9856831	10.399558
932	-6.4037989	11.214764
933	-5.8326694	11.424960
934	-8.1507939	12.384682
935	-6.3690733	11.883518
936	-7.1818011	12.138229
937	-6.2815685	9.931193
938	-6.0133761	12.522855
939	1.3747935	8.709006
940	2.8657699	4.938066
941	-4.6488674	10.974287
942	-4.3683964	10.561302
943	-3.4755128	9.264423
944	-3.2174169	8.910545
945	-2.8094248	8.284257
946	-3.5510249	9.203769
947	-2.5985671	7.947927
948	-3.3120970	8.190291
949	-2.7569592	8.176866
950	-2.8927558	8.371443
951	-3.2460135	9.130998
952	-5.3332814	11.107692
953	-5.5977161	11.430446
954	-5.7338803	11.592400
955	-5.6605262	11.494656
956	-5.8967155	11.532405
957	-5.4309319	11.028126
958	-5.5628242	10.941602
959	-6.3148747	11.125728
960	-7.5155914	11.958570
961	-6.1812417	11.819586
962	-3.6453841	7.621982
963	-6.1642261	12.086467
964	-5.9534081	13.504872
965	1.4047451	8.214099
966	3.6190500	5.589325
967	1.7197848	8.964512
968	0.7998529	9.216107
969	0.7779436	8.725646
970	-1.4939237	9.679480
971	-1.7693066	8.505583

	lower bound	upper bound
972	-1.9316301	8.784608
973	-0.6109980	8.916668
974	-2.3739080	10.045972
975	0.7035774	7.860569
976	0.9906410	7.510671
977	0.6995367	7.757569
978	-1.7511844	8.080094
979	-1.0114309	8.102097
980	-0.7387777	8.168190
981	1.4353746	8.051042
982	1.8768447	7.049360
983	2.8426058	6.497279
984	1.5899218	8.113203
985	-5.0757029	11.354859
986	-3.1250128	9.244833
987	-3.1719019	9.420928
988	-4.0011382	11.290371
989	-0.9333809	10.672558
990	-1.2027035	11.952574
991	-1.6001401	8.718633
992	-0.3967578	7.890102
993	-1.2533115	7.959797
994	-0.3966131	7.890103
995	-0.0997571	8.568995
996	-0.4549392	9.264203
997	0.6860622	10.131133
998	-0.7752059	8.224331
999	-0.4861060	9.158882
1000	-0.3511053	8.803991
1001	1.0026228	6.841327
1002	-2.3463701	8.986136
1003	-1.5499976	9.810834
1004	-1.1297481	9.597224
1005	-1.1212358	9.778080
1006	-0.5932134	11.183745
1007	2.4282751	10.343154
1008	3.5107008	10.313175
1009	-1.5328638	10.640531
1010	-1.9738010	9.084755
1011	-1.2883086	9.619583
1012	-0.2144597	9.494870
1013	0.3787016	10.046437
1014	-0.2209082	10.487955
1015	1.1724011	11.090731
1016	1.7175455	11.790487
1017	-0.3103817	9.939696
1018	2.5292220	10.486024
1019	5.9010810	8.144071
1020	-1.3509528	10.027295
1021	1.4993477	11.925815
1022	-1.7167543	10.002373
1023	-1.7594640	10.064602

	lower bound	upper bound
1024	0.4789638	9.275155
1025	2.2245191	6.868398
1026	1.3468724	8.094508
1027	2.8226230	6.417446
1028	-1.3387761	11.339006
1029	1.5156023	11.359576
1030	1.0610436	12.015741
1031	-4.7021177	11.842857
1032	2.9822350	12.884329
1033	3.9586229	12.738901
1034	-8.0899628	14.284732
1035	-7.1518683	13.014062
1036	-6.3145294	11.415636
1037	-4.4400914	8.653698
1038	-5.8593749	11.582923
1039	-5.8348219	11.454314
1040	-4.2607335	9.562186
1041	-4.2607001	9.562189
1042	-5.2583608	11.110997
1043	-5.0848538	10.683813
1044	-4.3443107	10.079529
1045	-4.7647922	10.298459
1046	-4.9228151	10.495973
1047	-5.2047781	10.753431
1048	-5.2742817	10.911282
1049	-5.2596916	9.165417
1050	-5.3417294	10.686823
1051	-4.6717995	8.938812
1052	-5.9074633	11.567504
1053	-6.6619665	11.692701
1054	-5.2155187	10.828602
1055	-4.7095147	10.886121
1056	-10.8227005	16.594240
1057	-13.4840652	19.266721
1058	-11.1761002	16.950154
1059	-10.3246574	16.097015
1060	-7.2868256	13.077355
1061	-5.7454484	11.323164
1062	-5.9102085	11.165305
1063	-3.6455040	9.159842
1064	-2.8339580	8.596898
1065	-3.5015581	9.185910
1066	-1.9441581	8.568233
1067	-2.6054503	8.593901
1068	-2.9312462	9.070816
1069	-5.3838466	10.628972
1070	-4.7609232	9.825579
1071	-5.3424462	10.124497
1072	-6.0045926	10.967171
1073	-6.5667198	12.597252
1074	-5.1475351	12.192707
1075	-5.3058117	12.037323

	lower bound	upper bound
1076	-5.5459045	12.192914
1077	-2.8229870	9.665293
1078	-2.6913846	9.720461
1079	-9.3389999	15.120961
1080	-9.0163867	14.948191
1081	-7.1896481	13.508403
1082	-6.5009242	12.635621
1083	-4.6531282	12.058140
1084	-5.5056215	11.291559
1085	-5.6376647	11.337416
1086	-5.4949586	11.356736
1087	-5.1755010	11.341472
1088	-3.1988897	10.185528
1089	-8.2586624	14.126411
1090	-6.7793713	12.877937
1091	-6.0678601	12.323394
1092	-4.8729928	10.895160
1093	-5.0411706	11.231190
1094	-5.4884869	11.633752
1095	-5.0492341	11.002440
1096	-5.5685583	11.420241
1097	-4.0132260	11.306067
1098	-0.2986674	7.286472
1099	-7.7486211	14.377348
1100	-7.3117063	13.799979
1101	-7.1941550	13.622904
1102	-7.1918836	13.381108
1103	-5.1838708	12.048886
1104	-2.4747475	10.666866
1105	-2.6190870	10.965365
1106	-9.1288563	14.970397
1107	-8.0687868	14.490558
1108	-5.3969254	11.183472
1109	-4.4647062	10.212640
1110	-4.4492661	9.898334
1111	-4.6754978	10.307988
1112	-4.2290038	9.242561
1113	-4.0391636	9.866727
1114	-5.8873894	11.391484
1115	-3.0394846	9.266601
1116	-3.0714096	9.030276
1117	-2.8041341	8.883850
1118	-1.2007431	7.754583
1119	-4.8536633	10.412989
1120	-3.2094397	10.034784
1121	-5.0908429	10.211007
1122	-2.5369010	7.542743
1123	-5.8388830	11.599623
1124	-5.4831282	10.686893
1125	-7.1517906	13.389079
1126	-10.9923037	16.760071
1127	-13.1454147	18.779245

	lower bound	upper bound
1128	-6.5515089	8.975094
1129	-11.5796844	16.238993
1130	-13.9146023	19.687142
1131	-14.8431042	20.664270
1132	-7.1228602	14.766189
1133	-13.5491680	19.369401
1134	-10.7890691	16.588507
1135	-8.0492164	14.071372
1136	-6.2611994	12.381085
1137	-5.6584286	11.914563
1138	-5.7444859	12.456206
1139	-3.4998538	9.827437
1140	-3.4998652	9.827423
1141	-7.5111403	13.523395
1142	-3.3109374	10.009046
1143	-2.8945129	10.109422
1144	-3.1401513	9.453826
1145	-3.2279814	8.782567
1146	-5.9157499	12.919009
1147	-6.0327577	13.846635
1148	-8.7776391	16.069111
1149	-7.2081073	13.999294
1150	-5.1872966	12.968805
1151	-1.9138496	11.726792
1152	-14.1139929	19.889718
1153	-8.9198937	14.823565
1154	-7.6536631	13.467006
1155	-7.6691941	13.397236
1156	-8.3456514	13.889537
1157	-9.0972529	14.392630
1158	-8.2759253	14.053153
1159	-10.2025809	15.984372
1160	-10.3861361	16.120022
1161	-8.4626235	14.411354
1162	-8.9039482	14.783225
1163	-6.6427232	11.512056
1164	-8.5412969	14.777811
1165	-8.9461886	15.085496
1166	-8.5594324	14.678909
1167	-8.6965225	14.811063
1168	-7.1324286	13.893493
1169	-7.1982938	13.767968
1170	-7.5235065	13.301143
1171	-8.2848689	13.992840
1172	-9.1573304	14.803527
1173	-9.5456996	15.295745
1174	-9.6641112	15.573907
1175	-8.7049548	14.367529
1176	-8.4525828	14.122592
1177	-8.8561367	14.564631
1178	-7.3183714	12.870706
1179	-7.2340734	12.614831

	lower bound	upper bound
1180	-4.9158898	8.979220
1181	0.7245941	2.962577
1182	-8.0031068	13.227001
1183	-7.0086519	12.487469
1184	-7.0707558	12.972300
1185	-6.8414801	12.662391
1186	-8.1549848	14.050752
1187	-5.3633588	11.270219
1188	-4.9817294	11.192238
1189	-4.8281487	11.110817
1190	-4.6365097	10.930927
1191	-3.2389907	10.527407
1192	-3.9670556	11.489595
1193	-2.2730891	10.818734
1194	-0.0515739	10.622047
1195	-5.6561463	11.549098
1196	-6.0054861	11.810783
1197	-4.8979241	10.880146
1198	-3.6903874	10.090839
1199	-3.2432965	10.362374
1200	-1.8459135	11.441442
1201	-3.3907797	10.373669
1202	-1.7369433	9.808204
1203	-0.2204080	8.199741
1204	-3.4779507	10.380253
1205	-2.1027308	9.818131
1206	-4.2736858	10.807176
1207	-4.4245065	11.864005
1208	0.0476835	7.385996
1209	-6.8564105	12.977929
1210	-7.0381929	12.912338
1211	-5.0640515	11.093570
1212	-5.2560700	11.463067
1213	-6.1092019	13.552136
1214	-4.8057532	11.924938
1215	-5.1199892	11.183864
1216	-5.7928463	12.047777
1217	-3.4292911	10.195445
1218	-2.8963194	9.226460
1219	-0.0370792	8.938829
1220	-8.3491146	13.631683
1221	-4.5667408	10.344593
1222	-5.8107003	11.806814
1223	-5.4784913	11.238791
1224	-5.1063940	11.157711
1225	-5.1349855	11.192050
1226	-5.0030173	10.337438
1227	-4.8264581	10.238340
1228	-4.3132359	9.708624
1229	-4.3413425	9.860414
1230	-5.0384001	10.759877
1231	-4.6854025	10.772753

	lower bound	upper bound
1232	-3.4345649	10.140131
1233	-2.8451412	9.568088
1234	-3.0626988	9.887427
1235	-3.5255729	10.635746
1236	-4.6472379	10.691773
1237	-3.5568899	9.527497
1238	-2.7849959	9.144109
1239	-2.3627964	8.882895
1240	-2.0889662	9.231187
1241	-1.4052454	7.862024
1242	-1.3826145	8.461040
1243	-0.2592697	9.693366
1244	0.1784624	9.895905
1245	1.3706509	10.477894
1246	-1.4161944	7.599651
1247	-1.3257159	6.602735
1248	-1.8992735	8.067552
1249	2.4472256	6.013623
1250	2.9625157	6.763429
1251	-1.8539128	10.204326
1252	0.1534859	12.487475
1253	-2.8870869	9.657469
1254	0.3420226	10.301210
1255	0.2714264	10.357041
1256	3.3010566	9.049665
1257	0.7285089	10.416934
1258	1.1829278	9.995869
1259	1.1961998	9.532495
1260	-1.7103764	12.223985
1261	-4.2111065	10.196344
1262	-0.4403230	9.939065
1263	-4.2897910	10.056094
1264	-4.0615838	9.858660
1265	-4.4212158	10.204051
1266	-5.0959442	10.914763
1267	-5.3827089	11.666069
1268	-4.7614809	11.236716
1269	-4.7006760	11.386255
1270	-4.4619110	11.294201
1271	-3.4301227	11.359310
1272	-1.6415371	11.428045
1273	-0.6517933	11.285541
1274	-2.2448971	12.348736
1275	-5.4545142	11.867145
1276	-5.0384560	11.464933
1277	-4.2070353	10.916541
1278	-3.7533672	10.561431
1279	-3.6120184	10.161088
1280	-2.3129767	8.535817
1281	-3.8477236	9.892944
1282	-3.9740603	10.098765
1283	-4.2023720	10.718971

	lower bound	upper bound
1284	-4.3919940	11.054989
1285	-4.6355866	10.715316
1286	-0.1899689	10.734136
1287	-3.5067587	9.613957
1288	-4.0092255	10.369036
1289	-3.8955777	10.579717
1290	1.3126129	7.475120
1291	-1.5972003	8.501914
1292	-1.4574098	8.471390
1293	-2.2502183	9.134789
1294	-3.6040771	9.813880
1295	-4.4155173	11.647941
1296	-4.0890358	10.618625
1297	-1.2115232	12.260390
1298	1.7718910	13.757437
1299	3.4445509	13.982857
1300	-5.2047886	10.979422
1301	-5.8996775	11.933361
1302	-6.2332038	12.630875
1303	-2.5427791	11.404828
1304	-2.1540733	11.084445
1305	-5.5488706	11.834115
1306	-5.6757892	12.012749
1307	-5.8179841	12.642999
1308	-0.9744126	12.402684
1309	-6.5563222	12.090540
1310	-4.7881650	10.739010
1311	-7.4567803	14.520899
1312	-4.2473698	10.192132
1313	-3.7568006	9.799265
1314	-3.6880940	9.640305
1315	-3.6164895	9.457341
1316	-6.3358284	11.708586
1317	-3.6383413	9.455975
1318	-4.2675115	10.149719
1319	-2.4033148	8.683947
1320	-4.0123407	10.557069
1321	-4.5037469	10.411951
1322	-5.1301293	10.975091
1323	-4.0207409	9.831966
1324	-2.4606569	8.358863
1325	-4.5325202	10.291262
1326	-4.1756829	10.137023
1327	-5.4003024	12.102068
1328	-4.0835826	10.068619
1329	-4.2497800	10.974340
1330	-2.8824443	12.159059
1331	-3.9473834	11.751055
1332	-4.9300750	10.820700
1333	-4.5412356	9.828743
1334	-3.6612014	8.826194
1335	-3.9738539	9.005660

	lower bound	upper bound
1336	-4.8902288	9.755835
1337	-3.7778140	8.896247
1338	-3.6113685	8.671618
1339	-3.6530896	8.737514
1340	-4.2326783	8.932296
1341	-6.0768044	11.614975
1342	-4.1999566	9.731684
1343	-7.2403071	12.232915
1344	-3.4080394	8.878668
1345	-3.5442687	8.876673
1346	-4.0072233	9.175742
1347	-4.2165565	9.668052
1348	-4.1352678	9.643416
1349	-3.8717696	9.167847
1350	-3.6617405	9.188933
1351	-5.0572738	10.062191
1352	-5.5192015	10.246821
1353	-3.7940115	9.481893
1354	-3.0404455	8.785842
1355	-3.2025738	8.787496
1356	-3.9158539	9.145660
1357	-4.1840516	9.006387
1358	-3.6321241	9.098020
1359	-4.4081559	9.627932
1360	-4.2835351	9.492766
1361	-3.8339154	8.671115
1362	-2.1036910	6.357503
1363	-3.1340798	7.598436
1364	-3.2855068	9.148356
1365	-1.1405191	8.100981
1366	-3.5051994	9.339207
1367	-5.8632837	11.614454
1368	-3.9336236	9.740634
1369	-4.1464566	9.521963
1370	-4.8510952	9.432384
1371	-4.0094457	9.949528
1372	-5.0678927	11.291083
1373	-3.4786587	10.161764
1374	-4.2837983	9.439963
1375	-4.8024203	9.715803
1376	-4.3439608	9.378816
1377	-5.1980577	9.710837
1378	-6.0783387	11.850855
1379	-5.9767391	11.747399
1380	-6.6255398	12.393861
1381	-7.5129290	13.294583
1382	-3.7959080	9.597052
1383	-3.9408233	9.717474
1384	-4.6086396	10.235712
1385	-4.8762579	10.655620
1386	-4.0027435	10.214429
1387	-5.3459287	11.562411

	lower bound	upper bound
1388	-5.0329485	11.935223
1389	-4.4224972	12.299801
1390	-4.4029019	11.280881
1391	-2.2940907	10.609355
1392	-0.7507072	9.738853
1393	1.6393857	6.222670
1394	-5.5116252	10.763141
1395	-6.2740050	11.809929
1396	-5.7008715	11.487031
1397	-5.8388678	11.601419
1398	-2.6051759	8.960151
1399	-3.6512024	9.498787
1400	-3.7687804	9.584051
1401	-3.7570922	9.672813
1402	-4.1307919	9.982211
1403	-4.8216016	10.746703
1404	-4.3724430	10.909169
1405	-4.5932414	11.010501
1406	-4.2607517	11.835138
1407	-2.7054797	11.774847
1408	-4.2447994	10.528639
1409	-4.2698647	10.400692
1410	-4.1008651	10.366760
1411	-4.5375768	10.883324
1412	-4.4639819	11.159455
1413	-4.9158967	12.207382
1414	-5.7150081	12.193884
1415	-4.5868837	11.783983
1416	-2.7850699	11.662044
1417	-2.8204655	11.569148
1418	-4.5321848	10.437676
1419	-4.6319087	11.079273
1420	-4.5447112	11.653904
1421	-4.6499068	11.236523
1422	-5.7624310	11.754169
1423	-4.9932745	11.116416
1424	-4.0898799	9.992411
1425	-4.0508951	9.994980
1426	-3.8118041	9.744351
1427	-4.2276774	10.194382
1428	-5.1891676	11.257762
1429	-4.6462853	11.508226
1430	-4.0755370	10.010566
1431	-5.2788362	11.615626
1432	-4.0715131	9.840328
1433	-3.8577516	9.606098
1434	-3.9534327	9.676672
1435	-4.8069360	10.491340
1436	-4.2192548	9.885843
1437	-4.2088780	10.037529
1438	-4.0650016	9.989365
1439	-3.3633773	9.355764

	lower bound	upper bound
1440	-2.7088785	8.743012
1441	-2.8175149	8.935446
1442	-3.3023016	9.390481
1443	-3.1414813	10.382053
1444	-4.3639203	10.087835
1445	-5.1689675	11.613022
1446	-5.1936052	11.813595
1447	-4.2293192	11.064056
1448	-5.2558615	11.080064
1449	-4.8737726	11.547585
1450	-3.2989183	10.339154
1451	-2.8853301	10.701902
1452	-3.3452490	10.041781
1453	-1.6033919	9.378611
1454	-4.0092254	10.456601
1455	-6.7519042	12.250202
1456	-8.0350691	13.890635
1457	-8.9077434	13.779318
1458	-4.6708383	6.114000
1459	-5.5115622	12.620958
1460	-5.2110230	12.513178
1461	-4.7184117	12.076100
1462	-8.8142625	14.533022
1463	-10.0106964	15.174444
1464	-8.0542196	13.485009
1465	-4.9520289	10.275808
1466	-5.7741752	11.522885
1467	-5.6217901	11.369692
1468	-5.4719086	11.219881
1469	-4.8931278	10.611813
1470	-5.1673679	10.836058
1471	-4.6541865	10.485316
1472	-4.1076194	10.224416
1473	-3.8035286	9.972492
1474	-3.7167129	9.851807
1475	-4.9921518	11.703799
1476	-3.8319075	9.938033
1477	-3.8160954	10.153897
1478	-2.8707959	10.018493
1479	-5.0286684	10.531557
1480	-4.1724249	10.236621
1481	-3.0340745	9.615827
1482	-1.8118061	8.198629
1483	-5.0330475	10.820708
1484	-4.2912035	10.719457
1485	-4.0401489	10.639716
1486	-3.8033965	9.440990
1487	-4.7777707	10.050897
1488	-5.3246075	10.400598
1489	-3.3884305	9.127993
1490	-4.3088070	10.198600
1491	-3.7490184	10.532039

	lower bound	upper bound
1492	-1.6612814	9.640070
1493	-1.1263628	9.325047
1494	-0.1017458	8.884127
1495	0.0004634	8.976212
1496	-2.8324446	8.522176
1497	-2.6845042	8.359627
1498	-2.7012486	8.258989
1499	-2.4511059	8.017202
1500	-2.2288667	7.804484
1501	-2.8311191	9.038763
1502	-2.8979014	9.849769
1503	-2.8312011	9.039049
1504	-2.3846498	7.708911
1505	-2.8902533	8.224799
1506	-2.9511972	8.795500
1507	-2.1673841	8.178672
1508	-4.0109969	9.896424
1509	-3.7567222	9.406853
1510	-3.0963286	8.646817
1511	-2.8590232	8.395291
1512	-2.9078742	8.421798
1513	-3.7224056	9.397521
1514	-4.0310826	9.206901
1515	-3.7409199	9.349161
1516	-3.6025134	8.870850
1517	-3.8644326	8.648842
1518	-2.9572344	7.195557
1519	-7.0322608	12.742501
1520	-4.5761192	10.239380
1521	-6.3303265	11.771131
1522	-6.0627232	11.629442
1523	-7.2570180	11.942419
1524	-4.3724716	10.139996
1525	-3.6945915	9.501560
1526	-3.4206935	9.233865
1527	-3.3680543	8.788756
1528	-3.4380311	8.667839
1529	-3.4849578	8.655827
1530	-3.9725320	9.016639
1531	-3.2315117	8.627808
1532	-4.2478569	9.289713
1533	-7.0733540	12.856224
1534	-8.2419848	14.163755
1535	-8.0145650	16.190680
1536	2.5041240	9.462863
1537	-7.7613340	13.961540
1538	-4.5741764	11.414277
1539	-4.2423062	11.769148
1540	-3.7403461	12.152667
1541	-4.2635829	11.631454
1542	-2.3258678	12.290884
1543	-1.0741679	14.733133

	lower bound	upper bound
1544	3.5645107	14.046391
1545	-6.5255637	12.457466
1546	-4.6582199	10.553066
1547	-4.1417850	10.130001
1548	-4.7556925	12.308225
1549	-4.1408811	10.062746
1550	-4.0869160	9.894411
1551	-4.0596989	9.953328
1552	-4.3680622	9.773274
1553	-4.3869949	9.734282
1554	-1.2703856	5.990172
1555	-3.1487194	10.135353
1556	-2.1477145	10.739013
1557	-2.7449456	10.184887
1558	-1.5726930	9.330452
1559	-1.2132382	9.899408
1560	-1.6394774	9.120767
1561	-1.7291984	9.287039
1562	-2.1035449	11.568765
1563	-2.4985843	10.242180
1564	-3.6364492	9.516946
1565	-3.8723660	9.702038
1566	-5.6252707	11.511063
1567	-2.1775559	7.699526
1568	-3.9818106	9.855604
1569	-4.1497243	10.469003
1570	-4.0649634	10.542836
1571	-2.7121542	8.583434
1572	-1.9985389	8.021798
1573	-2.1868110	8.301097
1574	-3.2342548	9.748901
1575	-3.8907964	10.458878
1576	-2.3308362	8.621792
1577	-2.2703799	10.012977
1578	-0.1050223	10.884755
1579	-2.2213142	9.681014
1580	-2.8674664	8.987354
1581	-2.4598160	8.503483
1582	-2.6992149	8.944373
1583	-2.4330286	8.398059
1584	-2.1316960	8.192206
1585	-2.1004457	8.089239
1586	-2.3338406	8.268105
1587	0.1589470	4.447286
1588	-1.9226280	8.183313
1589	-2.0725012	9.143190
1590	-1.5227863	8.097947
1591	-2.2515442	9.235767
1592	-1.5379642	9.940698
1593	-0.6326732	10.161026
1594	-1.0438840	10.336685
1595	-3.2017223	10.004430

	lower bound	upper bound
1596	-1.5118172	8.187139
1597	-3.0351093	10.143658
1598	-1.6706584	8.590297
1599	-1.9160410	8.728828
1600	-2.4892112	8.898898
1601	-3.8274551	9.110888
1602	-4.5652143	8.572584
1603	-2.8529612	8.782169
1604	-3.5315963	13.162769
1605	-2.9683438	8.853744
1606	-2.3841028	7.093442
1607	-2.1773286	9.183538
1608	-1.8837114	10.262919
1609	-0.9385210	11.148514
1610	2.0764550	12.304123
1611	-2.1667172	9.182237
1612	-2.4125259	9.503033
1613	-3.9626921	9.966781
1614	-0.9742193	11.604044
1615	-4.9017689	10.731733
1616	-2.6634163	10.169563
1617	-0.2966751	8.785488
1618	-4.5078228	10.971464
1619	-2.7512152	10.460742
1620	-2.5545365	10.804528
1621	1.1780176	9.657522
1622	-3.2374305	11.673103
1623	-5.1489134	11.144793
1624	-3.9830141	11.137315
1625	-2.5854561	10.586701
1626	-1.5532293	6.687640
1627	-1.8685753	6.834124
1628	-2.5446395	9.914771
1629	-0.9500892	8.331766
1630	-12.4501888	18.209564
1631	-10.0334824	15.334214
1632	-7.3549269	12.665335
1633	-6.2647513	12.076378
1634	-12.1865064	17.969442
1635	-9.2095162	15.210775
1636	-4.9317109	11.391737
1637	-11.4788859	17.357210