Data analysis

Problem 1

Search Algorithm	Heuristic	Domain Actions	Expansions	Goal Tests	New Nodes	Plan Length	Time elapsed (seconds)
Breadth First Search		20	43	56	178	6	0.02634
Depth First Search		20	21	22	84	20	0.01680
Uniform Cost Search		20	60	62	240	6	0.06567
Greedy Best First Search	Unmet Goals	20	7	9	29	6	0.01040
	Level Sum	20	6	8	28	6	0.47710
	Max Level	20	6	8	24	6	0.36520
	Set Level	20	6	8	28	6	1.05531
A* Search	Unmet Goals	20	50	52	206	6	0.05627
	Level Sum	20	28	30	122	6	0.70481
	Max Level	20	43	45	180	6	0.78900
	Set Level	20	33	35	138	6	1.70491

Problem 2

Search Algorithm	Heuristic	Domain Actions	Expansions	Goal Tests	New Nodes	Plan Length	Time elapsed (seconds)
Breadth First Search		72	3343	4609	30503	9	0.64033
Depth First Search		72	624	625	5602	619	1.09864
Uniform Cost Search		72	5154	5156	46618	9	1.16339
Greedy Best First Search	Unmet Goals	72	17	19	170	9	0.06380
	Level Sum	72	9	11	86	9	1.26094
	Max Level	72	27	29	249	9	1.65193
	Set Level	72	9	11	84	9	3.96944
A* Search	Unmet Goals	72	2467	2469	22522	9	1.35928
	Level Sum	72	357	359	3426	9	12.34326
	Max Level	72	2887	2889	26594	9	69.45395
	Set Level	72	1037	1039	9605	9	186.80754

Problem 3

Search Algorithm	Heuristic	Domain Actions	Expansions	Goal Tests	New Nodes	Plan Length	Time elapsed (seconds)
Breadth First Search		88	14663	18098	129625	12	0.88557
Depth First Search		88	408	409	3364	392	0.27942
Uniform Cost Search		88	18510	18512	161936	12	1.37449
Greedy Best First Search	Unmet Goals	88	25	27	230	15	0.04219
	Level Sum	88	14	16	126	14	1.32965
	Max Level	88	21	23	195	13	1.20817
	Set Level	88	35	37	345	17	7.75036
A* Search	Unmet Goals	88	7308	7390	65711	12	1.11634
	Level Sum	88	369	371	3403	12	12.83952
	Max Level	88	9580	9582	86312	12	224.31976
	Set Level	88	3423	3425	31596	12	536.24249

Problem 4

Search Algorithm	Heuristic	Domain Actions	Expansions	Goal Tests	New Nodes	Plan Length	Time elapsed (seconds)
Breadth First Search		104	99736	114953	944130	14	4.77090
Depth First Search		104	25174	25175	228849	24132	832.20874
Uniform Cost Search		104	113339	113341	1066413	14	7.71296
Greedy Best First Search	Unmet Goals	104	29	31	280	18	0.04816
	Level Sum	104	17	19	165	17	1.54115
	Max Level	104	56	58	580	17	2.45123
	Set Level	104	107	109	1164	23	29.44411
A* Search	Unmet Goals	104	34330	34332	328509	14	4.46616
	Level Sum	104	1208	1210	12210	15	64.66808
	Max Level	104	62077	62079	599376	14	2132.38761
	Set Level	104	22606	22608	224229	14	5914.70926

Conclusions

- **Which algorithm or algorithms would be most appropriate for planning in a very restricted domain (i.e., one that has only a few actions) and needs to operate in real time?**
  Given a very restricted domain, Greedy Best First Search with Unmet Goals heuristic and Breadth First Search seem to do better than the others for problems 1 and 2.

- **Which algorithm or algorithms would be most appropriate for planning in very large domains (e.g., planning delivery routes for all UPS drivers in the U.S. on a given day)**
  Breadth First Search and A* Search with Unmet Goals heuristic seem to be the most appropriate. After them, Uniform Cost Search seems to do a better job than the other strategies.

- **Which algorithm or algorithms would be most appropriate for planning problems where it is important to find only optimal plans?**
  Breadth First Search, Uniform Cost Search and A* Search with Unmet Goals heuristic find optimal plans for all the observed problems.