Air Cargo Problem 1

Summary of Results

Algorithm	Actions	Expansions	Goal Tests	New Nodes	Plan Length	Time
Breadth first search	20	43	56	178	6	0.006
Depth first graph search	20	21	22	84	20	0.003
Uniform cost search	20	60	62	240	6	0.009
Greedy best first graph search h_unmet_goals	20	7	9	29	6	0.002
Greedy best first graph search h_pg_levelsum	20	6	8	28	6	0.370
Greedy best first graph search h_pg_maxlevel	20	6	8	24	6	0.294
Greedy best first graph search h_pg_setlevel	20	6	8	28	6	1.142
A* search h_unmet_goals	20	50	52	206	6	0.009
A* search h_pg_levelsum	20	28	30	122	6	0.982
A* search h_pg_maxlevel	20	43	45	180	6	1.022
A* search h_pg_setlevel	20	33	35	138	6	3.011

Air Cargo Problem 2

Summary of Results

Algorithm	Actions	Expansions	Goal Tests	New Nodes	Plan Length	Time
Breadth first search	72	3343	4609	30503	9	1.830
Depth first graph search	72	624	625	5602	619	2.861
Uniform cost search	72	5154	5156	46618	9	3.141
Greedy best first graph search h_unmet_goals	72	17	19	170	9	0.019
Greedy best first graph search h_pg_levelsum	72	9	11	86	9	8.833
Greedy best first graph search h_pg_maxlevel	72	27	29	249	9	18.293
Greedy best first graph search h_pg_setlevel	72	9	11	84	9	25.395
A* search h_unmet_goals	72	2467	2469	22522	9	2.118
A* search h_pg_levelsum	72	357	359	3426	9	232.866
A* search h_pg_maxlevel	72	2887	2889	26594	9	1329.608
A* search h_pg_setlevel	72	1037	1039	9605	9	1885.515

Air Cargo Problem 3

Summary of Results

Algorithm	Actions	Expansions	Goal Tests	New Nodes	Plan Length	Time
Breadth first search	88	14663	18098	129625	12	10.023
Depth first graph search	88	408	409	3364	392	1.124
Uniform cost search	88	18510	18512	161936	12	13.942
Greedy best first graph search h_unmet_goals	88	25	27	230	15	0.037
Greedy best first graph search h_pg_levelsum	88	14	16	126	14	20.745
Greedy best first graph search h_pg_maxlevel	88	21	23	195	13	24.701
Greedy best first graph search h_pg_setlevel	88	35	37	345	17	122.659
A* search h_unmet_goals	88	7388	7390	65711	12	7.876
A* search h_pg_levelsum	88	369	371	3403	12	367.723

Air Cargo Problem 4

Summary of Results

Algorithm	Actions	Expansions	Goal Tests	New Nodes	Plan Length	Time
Breadth first search	104	99736	114953	944130	14	88.194
Greedy best first graph search h_unmet_goals	104	29	31	280	18	0.0601
Greedy best first graph search h_pg_levelsum	104	17	19	165	17	36.189
A* search h_unmet_goals	104	34330	34332	328509	14	50.802
A* search h_pg_levelsum	104	1208	1210	12210	15	2063.194

Questions:

- **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?**
  Since the problem asks about real-time results with a small domain, then, generally speaking, greedy best-first search outperforms other algorithms in terms of speed and can be applied to real-life applications.

- **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)?**
  The problem is for a situation where the problem space is large. Therefore, we must choose an efficient algorithm with modest memory requirements. One can use DFS since it only keeps the nodes of the current path and no other nodes. A* is another viable option that will give an optimal solution. However, it is conditioned that A* uses an optimal heuristic.

- **Which algorithm or algorithms would be most appropriate for planning problems where it is important to find only optimal plans?**
  A* would be the best choice using any of its variants. The algorithm is sounds and generally optimal (assuming we are using an admissible heuristics).