HEURISTIC ANALYSIS

Uninformed Search Strategies:

Problem 1:

	Optimal	Path Length	Time	Expansions
Breadth first search	**Yes**	**6**	0.033	43
Breadth first tree search	**Yes**	**6**	0.7297	1458
Depth first graph search	No	12	0.0070	12
Depth limited search	No	50	0.1041	101
Uniform cost search	**Yes**	**6**	0.0701	55
Recursive best first search	**Yes**	**6**	2.214	4229
Greedy best first graph search	**Yes**	**6**	0.01123	7

If shortest path is the primary criteria, then ones marked in bold are the best options, but if time is main criteria then Depth first graph search, greedy best first search and uniform cost search are the best ones.

Problem 2:

	Optimal	Path Length	Time	Expansions
Breadth first search	**Yes**	**9**	11.82	3401
Depth first graph search	No	346	1.2009	350
Uniform cost search	**Yes**	**9**	9.06	4209
Greedy best first graph search	**Yes**	**9**	0.09183	472

If shortest path is the primary criteria, then the ones marked in bold are the best options, but if time is the main criteria then greedy best first graph, depth first graph search are the best options.

Problem 3:

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	Optimal	Path Length	Time	Expansions
Breadth first search	**Yes**	**12**	82.67	14491
Depth first graph search	No	3335	43.14	3491
Uniform cost search	**Yes**	**12**	41.51	17745
Greedy best first graph search	No	22	8.6737	3734

If shortest path is the primary criteria, then the ones marked in bold are the best options, but if time is the main criteria them uniform cost and depth first graph search are the options.

Informed (Heuristic) Search Strategies:

Problem 1:

	Optimal	Path Length	Time	Expansions
A* Search with h1	**Yes**	**6**	0.067	55
A* Search with h-ignore predictions	**Yes**	**6**	0.06640	41
A* Search with level sum heuristics	**Yes**	**6**	0.97153	11

Problem 2:

	Optimal	Path Length	Time	Expansions
A* Search with h1	**Yes**	**9**	9.284	4729
A* Search with h-ignore predictions	**Yes**	**9**	3.396	1445
A* Search with level sum heuristics	**Yes**	**9**	148.89	86

Problem 3:

	Optimal	Path Length	Time	Expansions
A* Search with h1	**Yes**	**12**	42.26	17745
A* Search with h-ignore predictions	**Yes**	**12**	12.8941	4934
A* Search with level sum heuristics	--	--	--	--

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All the A* algorithms have the same path length for all the problems, if shortest time is the criteria then A* with h-ignore predictions is the best algorithm. The A* Search with level sum heuristics uses the least memory but its execution time is much slower.

Informed Vs Uninformed Search Strategies:

Problem 1:

	Optimal	Path Length	Time	Expansions
Breadth first search	**Yes**	**6**	0.033	43
A* Search with h-ignore predictions	**Yes**	**6**	0.06640	41

Problem 2:

	Optimal	Path Length	Time	Expansions
Breadth first search	**Yes**	**9**	11.82	3401
A* Search with h-ignore predictions	**Yes**	**9**	3.396	1445

Problem 3:

	Optimal	Path Length	Time	Expansions
Breadth first search	**Yes**	**12**	82.67	14491
A* Search with h-ignore predictions	**Yes**	**12**	12.8941	4934

From the comparison results we can observe that A* with h-ignore predictions is best choice for the Air Cargo problem.

The results indicate that informed search strategies with custom heuristics over uninformed search strategies.

Optimality Sequence:

Problem 1:

Load(C1, P1, SFO)

Fly(P1, SFO, JFK)

Unload(C1, P1, JFK)

Load(C2, P2, JFK)

Fly(P2, JFK, SFO)

Unload(C2, P2, SFO)

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Problem 2:

Load(C3, P3, ATL)

Fly(P3, ATL, SFO)

Unload(C3, P3, SFO)

Load(C1, P1, SFO)

Fly(P1, SFO, JFK)

Unload(C1, P1, JFK)

Load(C2, P2, JFK)

Fly(P2, JFK, SFO)

Unload(C2, P2, SFO)

Problem 3:

Load(C2, P2, JFK)

Fly(P2, JFK, ORD)

Load(C4, P2, SFO)

Fly(P2, ORD, SFO)

Unload(C4, P2, SFO)

Load(C1, P1, SFO)

Fly(P1, SFO, ATL)

Load(C3, P1, ATL)

Fly(P1, ATL, JFK)

Unload(C3, P1, JFK)

Unload(C1, P1, JFK)

Unload(C2, P2, SFO)