Breadth\_first\_search:

Problem | Expansions | Goal Tests | Time Elapsed | Optimality

1 | 43 | 56 | 0.0328 | Yes

2 | 3343 | 4609 | 11.30 | Yes

3 | 14663 | 18098 | 87.84 | Yes

Depth\_first\_graph\_search:

Problem | Expansions | Goal Tests | Time Elapsed | Optimality

1 | 21 | 22 | 0.0097 | No

2 | 624 | 625 | 2.938 | No

3 | 408 | 409 | 1.400 | No

Uniform\_cost\_search:

Problem | Expansions | Goal Tests | Time Elapsed | Optimality

1 | 55 | 57 | 0.0239 | Yes

2 | 4853 | 4855 | 8.497 | Yes

3 | 18151 | 18153 | 38.23 | Yes

A\*\_ignore\_precond:

Problem | Expansions | Goal Tests | Time Elapsed | Optimality

1 | 41 | 43 | 0.02751 | Yes

2 | 1450 | 1452 | 3.209 | Yes

3 | 5038 | 5040 | 13.47 | Yes

A\*\_planning\_graph:

Problem | Expansions | Goal Tests | Time Elapsed | Optimality

1 | 11 | 13 | 0.6073 | Yes

2 | 86 | 88 | 54.85 | Yes

3 | 313 | 315 | 259.2 | Yes

Optimal Plans

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)

Problem 2:

Load(C1, P1, SFO)

Fly(P1, SFO, JFK)

Unload(C1, P1, JFK)

Load(C2, P2, JFK)

Fly(P2, JFK, SFO)

Unload(C2, P2, SFO)

Load(C3, P3, ATL)

Fly(P3, ATL, SFO)

Unload(C3, P3, SFO)

Problem 3:

Load(C1, P1, SFO)

Fly(P1, SFO, ATL)

Load(C3, P1, ATL)

Fly(P1, ATL, JFK)

Unload(C1, P1, JFK)

Load(C2, P2, JFK)

Fly(P2, JFK, ORD)

Load(C4, P2, ORD)

Fly(P2, ORD, SFO)

Unload(C2, P2, SFO)

Unload(C3, P1, JFK)

Unload(C4, P2, SFO)

Analysis:

The best heuristic is A\* search ignoring preconditions based on optimality and time elapsed. However, for simple problems like problem 1, other methods like uniform cost search may perform better, which is a simpler algorithm but still effective for simple problems.