Project 1

Question 6,7

	Goal found at depth	Nodes expanded	Nodes generated	Max Depth Reached	Memory Consumed *(x68 bytes)	Computation time (in secs)
BFS	13	4169	7240	14	3072	0.22
DFS	17	32944	32953	18	18	0.01
GBEFS	13	42090	42288	18	1088	0.03
A*	13	133	223	13	91	<0.001
A* Manhattan	13	22	37	13	16	<0.001
IDA*	13	133	222	13	90	<.0001

Search using A* considerably improved when we used Manhattan distance as heuristic function while performing the search. Latter was better in terms of all the parameters e.g nodes expanded,nodes generated,memory consumed.

Question 9

Soldepth = 10

	Goal found at depth	Nodes expanded	Nodes generated	Max Depth Reached	Memory Consumed *(x68 bytes)
w=0	10	75	112	18	38
w=0.2	8	9	18	8	10
w=0.4	8	9	18	8	10
w=0.6	8	16	29	8	14
w=0.8	8	78	137	8	60
w=1	8	326	561	9	236

SOLDEPTH = 9

	Goal found at depth	Nodes expanded	Nodes generated	Max Depth Reached	Memory Consumed *(x68 bytes)
w=0	9	79	123	18	45
w=0.2	9	23	43	10	21
w=0.4	9	14	26	9	13
w=0.6	9	24	46	9	23
w=0.8	9	116	200	9	85
w=1	9	532	895	10	364

SOLDEPTH = 8

	Goal found at depth	Nodes expanded	Nodes generated	Max Depth Reached	Memory Consumed *(x68 bytes)
w=0	8	88	131	18	44
w=0.2	8	24	45	10	22
w=0.4	8	15	28	8	14
w=0.6	8	17	31	8	15
w=0.8	8	76	134	8	59
w=1	8	282	467	9	186

SOLDEPTH = 7

	Goal found at depth	Nodes expanded	Nodes generated	Max Depth Reached	Memory Consumed *(x68 bytes)
w=0	7	101	148	18	48
w=0.2	7	23	44	9	22
w=0.4	7	15	30	7	16
w=0.6	7	19	37	7	19
w=0.8	7	57	97	7	41
w=1	7	148	247	8	100

SOLDEPTH = 6

	Goal found at depth	Nodes expanded	Nodes generated	Max Depth Reached	Memory Consumed *(x68 bytes)
w=0	6	9	18	6	10
w=0.2	6	7	15	6	9
w=0.4	6	7	15	6	9
w=0.6	6	9	18	6	10
w=0.8	6	31	55	6	25
w=1	6	112	187	7	76

SOLDEPTH = 5

	Goal found at depth	Nodes expanded	Nodes generated	Max Depth Reached	Memory Consumed *(x68 bytes)
w=0	5	6	12	5	7
w=0.2	5	6	12	5	7
w=0.4	5	6	12	5	7
w=0.6	5	6	12	5	7
w=0.8	5	26	44	6	19
w=1	5	38	69	6	32

SOLDEPTH = 4

	Goal found at depth	Nodes expanded	Nodes generated	Max Depth Reached	Memory Consumed *(x68 bytes)
w=0	4	5	10	4	6
w=0.2	4	5	10	4	6
w=0.4	4	5	10	4	6
w=0.6	4	5	10	4	6
w=0.8	4	10	19	4	10
w=1	4	24	41	5	18

Question 8

When we increase SOLDEPTH:

1. BFS gave the optimal solution, but time and space complexity increase exponentially with SOLDEPTH.
2. DFS expanded lots of nodes, uses less memory, runs in much less time than BFS but it does not give us optimal solution always.
3. GBEFS expanded less nodes compare to DFS, uses memory almost same as that of BFS, runs in less time than BFS and it also doesn't guarantee optimal solution.
4. A*, IDA* behaved almost same with respect to time and memory, better than all of above. A* gave optimal solution almost always and IDA* provided optimal solution every time.