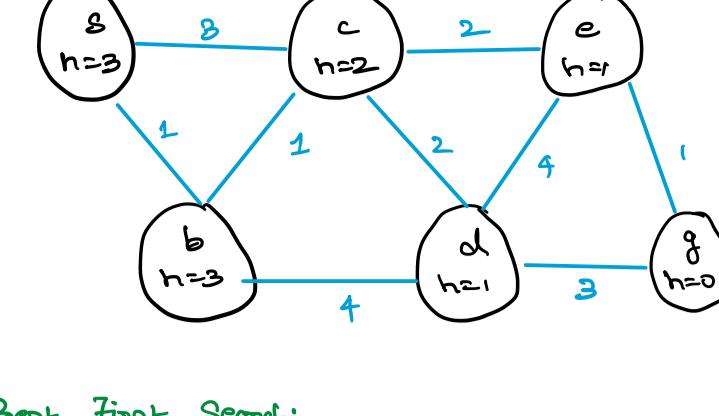


PROBLEM 1:Greedy/Best First Search:

Iteration 1:
 Vertex: b
 Position = $[b, [b]]$
 Explored = $\{b\}$
 Current Node = b → Is current Node goal state? = False
 Frontier = $\{[c, [b, c]], [b, [b, b]]\}$
 Unexplored = $\{c, [b, c], b, [b, b]\}$

Iteration 2:
 Frontier = $\{[c, [b, c]], [b, [b, b]]\}$
 Explored = $\{b\}$
 Current Node = c → Is current Node goal state? = False
 Frontier = $\{[d, [b, c, d]], [d, [b, c, d]], [e, [b, c, d]]\}$
 Unexplored = $\{d, [b, c, d], e, [b, c, d]\}$

Iteration 3:
 Frontier = $\{[d, [b, c, d]], [d, [b, c, d]], [e, [b, c, d]]\}$
 Explored = $\{b, c\}$
 Current Node = d → Is current Node goal state? = False
 Frontier = $\{[e, [b, c, d, e]], [f, [b, c, d, e]], [g, [b, c, d, e]]\}$
 Unexplored = $\{e, [b, c, d, e], f, [b, c, d, e], g, [b, c, d, e]\}$

Iteration 4:
 Frontier = $\{[e, [b, c, d, e]], [f, [b, c, d, e]], [g, [b, c, d, e]]\}$
 Explored = $\{b, c, d\}$
 Current Node = g → Is current Node goal state? = True
 Return True, $[S \rightarrow c \rightarrow d \rightarrow g]$

Iteration 5:
 Frontier = $\{[e, [b, c, d, e]], [f, [b, c, d, e]], [g, [b, c, d, e]]\}$
 Explored = $\{b, c, d, g\}$
 Current Node = f → Is current Node goal state? = False
 Frontier = $\{[h, [b, c, d, e, h]], [i, [b, c, d, e, h]], [j, [b, c, d, e, h]]\}$
 Unexplored = $\{h, [b, c, d, e, h], i, [b, c, d, e, h], j, [b, c, d, e, h]\}$

F* Search:

Iteration 1:
 Frontier = $\{[b, [b]]\}$
 Explored = $\{b\}$
 Current Node = b

Iteration 2:
 Frontier = $\{[c, [b, c, 2, 2]], [b, [b, 2, 2, 2]]\}$
 Explored = $\{b\}$
 Current Node = c

Iteration 3:
 Frontier = $\{[d, [b, c, d, 3, 2]], [b, [b, c, d, 3, 2], 3, 2]\}$
 Explored = $\{b, c\}$
 Current Node = d

Iteration 4:
 Frontier = $\{[e, [b, c, d, e, 4, 3]], [b, [b, c, d, e, 4, 3], 4, 3]\}$
 Explored = $\{b, c, d\}$
 Current Node = e

Iteration 5:
 Frontier = $\{[f, [b, c, d, e, f, 5, 4]], [b, [b, c, d, e, f, 5, 4], 5, 4]\}$
 Explored = $\{b, c, d, e\}$
 Current Node = f

Iteration 6:
 Frontier = $\{[g, [b, c, d, e, f, g, 6, 5]], [b, [b, c, d, e, f, g, 6, 5], 6, 5]\}$
 Explored = $\{b, c, d, e, f\}$
 Current Node = g

Iteration 7:
 Frontier = $\{[h, [b, c, d, e, f, g, h, 7, 6]], [b, [b, c, d, e, f, g, h, 7, 6], 7, 6]\}$
 Explored = $\{b, c, d, e, f, g\}$
 Current Node = h

Iteration 8:
 Frontier = $\{[i, [b, c, d, e, f, g, h, i, 8, 7]], [b, [b, c, d, e, f, g, h, i, 8, 7], 8, 7]\}$
 Explored = $\{b, c, d, e, f, g, h\}$
 Current Node = i

Iteration 9:
 Frontier = $\{[j, [b, c, d, e, f, g, h, i, j, 9, 8]], [b, [b, c, d, e, f, g, h, i, j, 9, 8], 9, 8]\}$
 Explored = $\{b, c, d, e, f, g, h, i\}$
 Current Node = j

Iteration 10:
 Frontier = $\{[k, [b, c, d, e, f, g, h, i, j, k, 10, 9]], [b, [b, c, d, e, f, g, h, i, j, k, 10, 9], 10, 9]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j\}$
 Current Node = k

Iteration 11:
 Frontier = $\{[l, [b, c, d, e, f, g, h, i, j, k, l, 11, 10]], [b, [b, c, d, e, f, g, h, i, j, k, l, 11, 10], 11, 10]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k\}$
 Current Node = l

Iteration 12:
 Frontier = $\{[m, [b, c, d, e, f, g, h, i, j, k, l, m, 12, 11]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, 12, 11], 12, 11]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l\}$
 Current Node = m

Iteration 13:
 Frontier = $\{[n, [b, c, d, e, f, g, h, i, j, k, l, m, n, 13, 12]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, n, 13, 12], 13, 12]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m\}$
 Current Node = n

Iteration 14:
 Frontier = $\{[o, [b, c, d, e, f, g, h, i, j, k, l, m, o, 14, 13]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, 14, 13], 14, 13]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n\}$
 Current Node = o

Iteration 15:
 Frontier = $\{[p, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, 15, 14]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, 15, 14], 15, 14]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o\}$
 Current Node = p

Iteration 16:
 Frontier = $\{[q, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, 16, 15]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, 16, 15], 16, 15]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p\}$
 Current Node = q

Iteration 17:
 Frontier = $\{[r, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, 17, 16]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, 17, 16], 17, 16]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q\}$
 Current Node = r

Iteration 18:
 Frontier = $\{[s, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, s, 18, 17]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, s, 18, 17], 18, 17]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r\}$
 Current Node = s

Iteration 19:
 Frontier = $\{[t, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, 19, 18]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, 19, 18], 19, 18]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s\}$
 Current Node = t

Iteration 20:
 Frontier = $\{[u, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, u, 20, 19]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, u, 20, 19], 20, 19]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t\}$
 Current Node = u

Iteration 21:
 Frontier = $\{[v, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, 21, 20]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, 21, 20], 21, 20]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u\}$
 Current Node = v

Iteration 22:
 Frontier = $\{[w, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, 22, 21]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, 22, 21], 22, 21]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v\}$
 Current Node = w

Iteration 23:
 Frontier = $\{[x, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, 23, 22]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, 23, 22], 23, 22]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w\}$
 Current Node = x

Iteration 24:
 Frontier = $\{[y, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, 24, 23]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, 24, 23], 24, 23]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x\}$
 Current Node = y

Iteration 25:
 Frontier = $\{[z, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, 25, 24]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, 25, 24], 25, 24]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y\}$
 Current Node = z

Iteration 26:
 Frontier = $\{[a, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, a, 26, 25]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, a, 26, 25], 26, 25]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z\}$
 Current Node = a

Iteration 27:
 Frontier = $\{[b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, b, 27, 26]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, b, 27, 26], 27, 26]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z\}$
 Current Node = b

Iteration 28:
 Frontier = $\{[c, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, b, c, 28, 27]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, b, c, 28, 27], 28, 27]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z\}$
 Current Node = c

Iteration 29:
 Frontier = $\{[d, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, b, c, d, 29, 28]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, b, c, d, 29, 28], 29, 28]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z\}$
 Current Node = d

Iteration 30:
 Frontier = $\{[e, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, b, c, d, e, 30, 29]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, b, c, d, e, 30, 29], 30, 29]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z\}$
 Current Node = e

Iteration 31:
 Frontier = $\{[f, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, b, c, d, e, f, 31, 30]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, b, c, d, e, f, 31, 30], 31, 30]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z\}$
 Current Node = f

Iteration 32:
 Frontier = $\{[g, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, b, c, d, e, f, g, 32, 31]], [b, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, b, c, d, e, f, g, 32, 31], 32, 31]\}$
 Explored = $\{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z\}$
 Current Node = g

Iteration 33:
 Frontier = $\{[h, [b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r, t, v, w, x, y, z, b, c, d, e, f, g,$