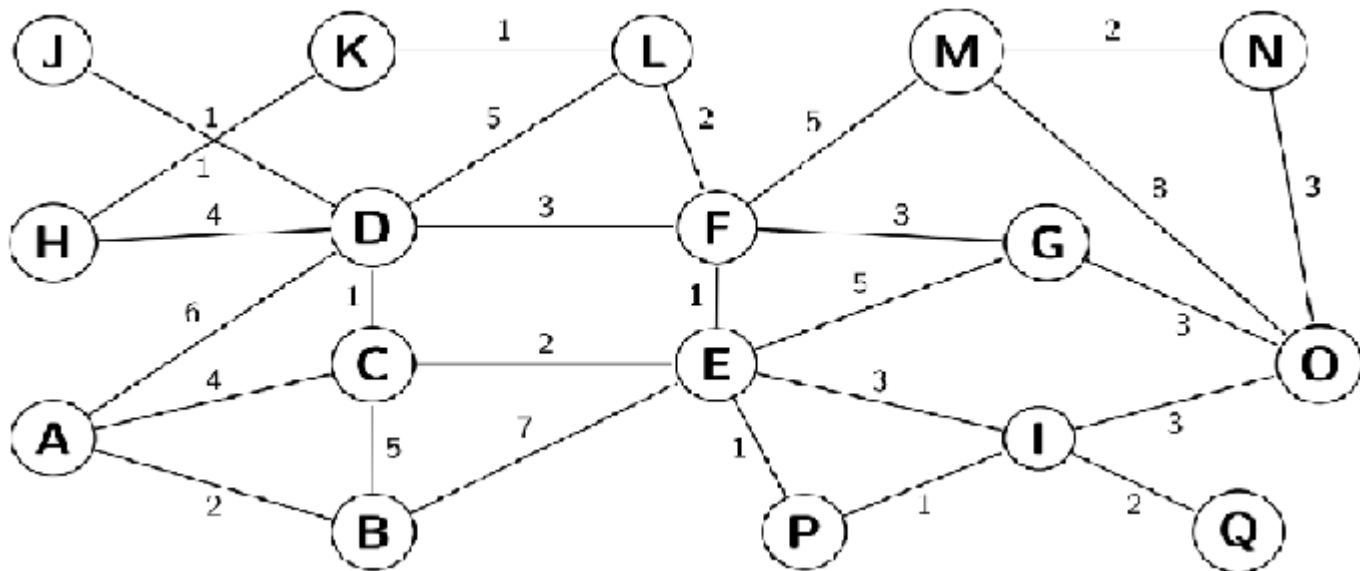# Introduction to AI - Exercise I
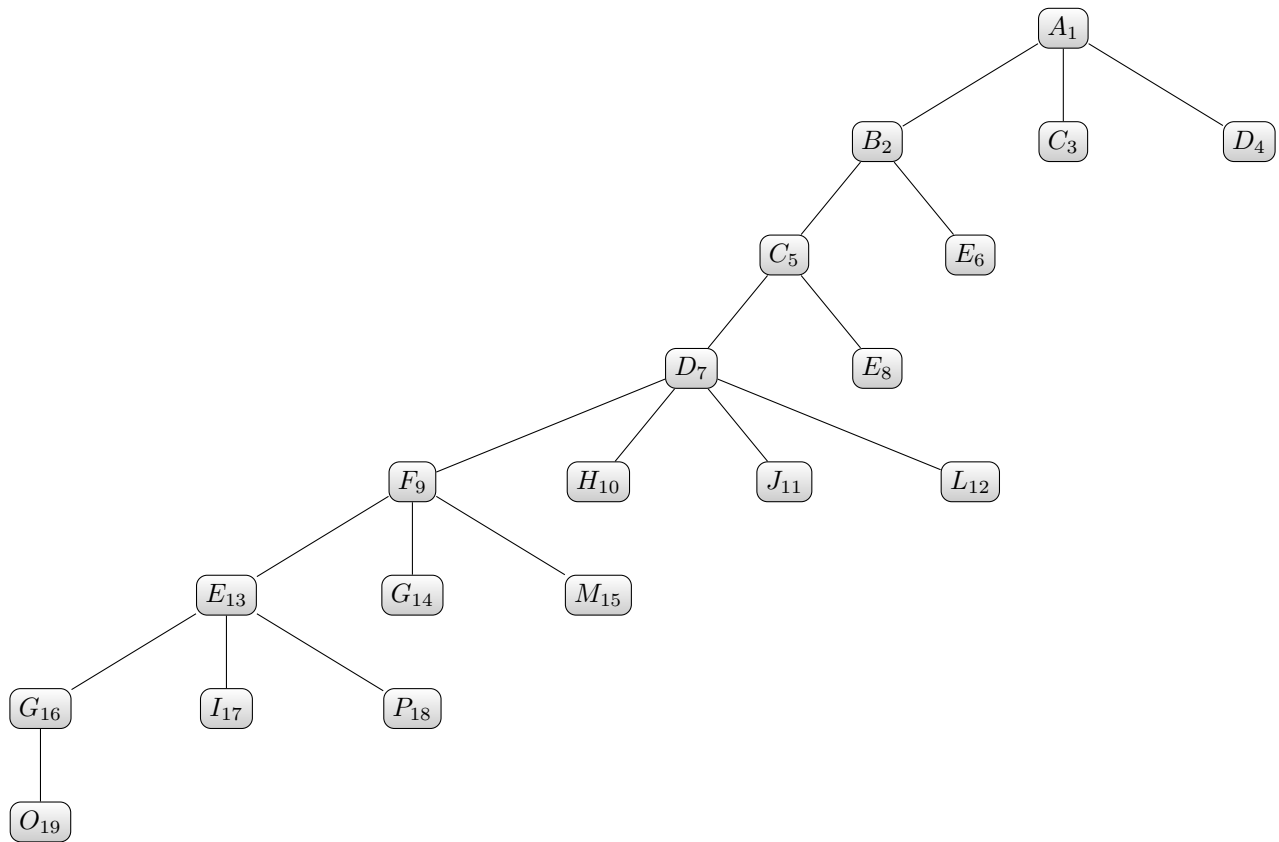
Tom Goodman

1   Graph

2   Question One

2.1   Brief

For this exercise ignore the path costs. Perform Depth-First-Search to find a path from A to O. Assume that nodes are expanded in alphabetic order. Write down carefully the values in your data structures Explored and Frontier as well as the search tree. [30% − 30 marks]

2.2   Answer - Data Structures

Frontier	Explored
$[A_1]$	$[\,]$
$[B_2, C_3, D_4]$	$[A_1]$
$[C_5, E_6, C_3, D_4]$	$[A_1, B_2]$
$[D_7, E_8, E_6, C_3, D_4]$	$[A_1, B_2, C_5]$
$[F_9, H_{10}, J_{11}, L_{12}, E_8, E_6, C_3, D_4]$	$[A_1, B_2, C_5, D_7]$
$[E_{13}, G_{14}, M_{15}, H_{10}, J_{11}, L_{12}, E_8, E_6, C_3, D_4]$	$[A_1, B_2, C_5, D_7, F_9]$
$[G_{16}, I_{17}, P_{18}, G_{14}, M_{15}, H_{10}, J_{11}, L_{12}, E_8, E_6, C_3, D_4]$	$[A_1, B_2, C_5, D_7, F_9, E_{13}]$
$[O_{18}, I_{17}, P_{18}, G_{14}, M_{15}, H_{10}, J_{11}, L_{12}, E_8, E_6, C_3, D_4]$	$[A_1, B_2, C_5, D_7, F_9, E_{13}, G_{16}]$

2.3   Answer - Tree

A_1

B_2 C_3 D_4

C_5 E_6

D_7 E_8

F_9 H_{10} J_{11} L_{12}

E_{13} G_{14} M_{15}

G_{16} I_{17} P_{18}

O_{19}

2.4   Answer - Sequence

The following sequence is the solution to reach the goal state, $\{O\}$.

$$[A_1, B_2, C_5, D_7, F_9, E_{13}, G_{16}, O_{19}]$$