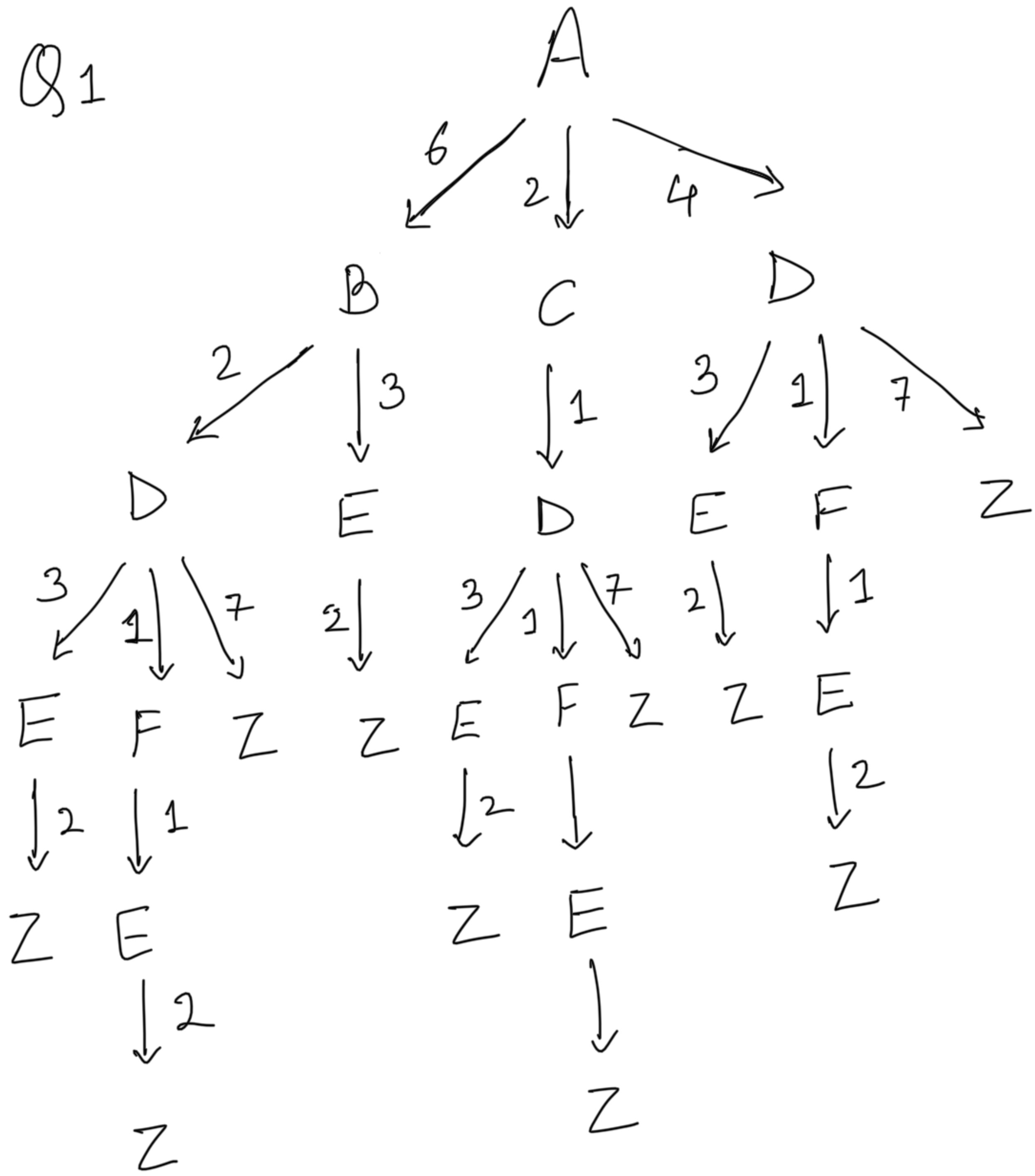
Written homework 1

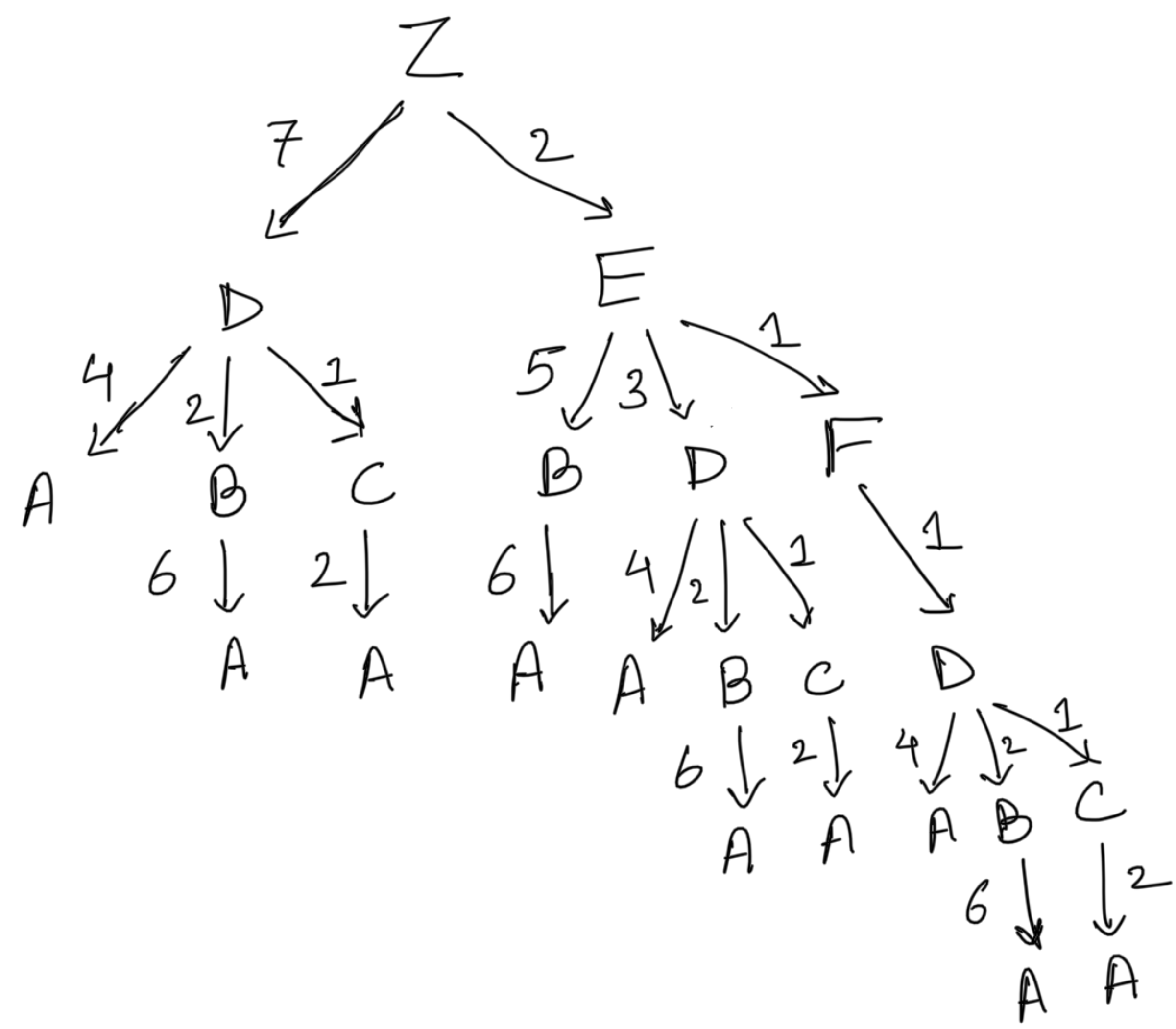
Q1



Q2 nodes traversed in BFS :

{A, AB, AC, AD, ABD, ABE, ACD, ADE,
ADF, ADZ}

Q3



Q4 reverse uniform cost tree

traversal = { Z, ZE, ZEF, ZEFD, ZEFDC, ZED, ZEFDB, ZEDC, ZEFDCA }

cost = 0, 2, 3, 4, 5, 5, 6, 6, 7

cost = 7

Q5 initial priority queue = { A, Z }

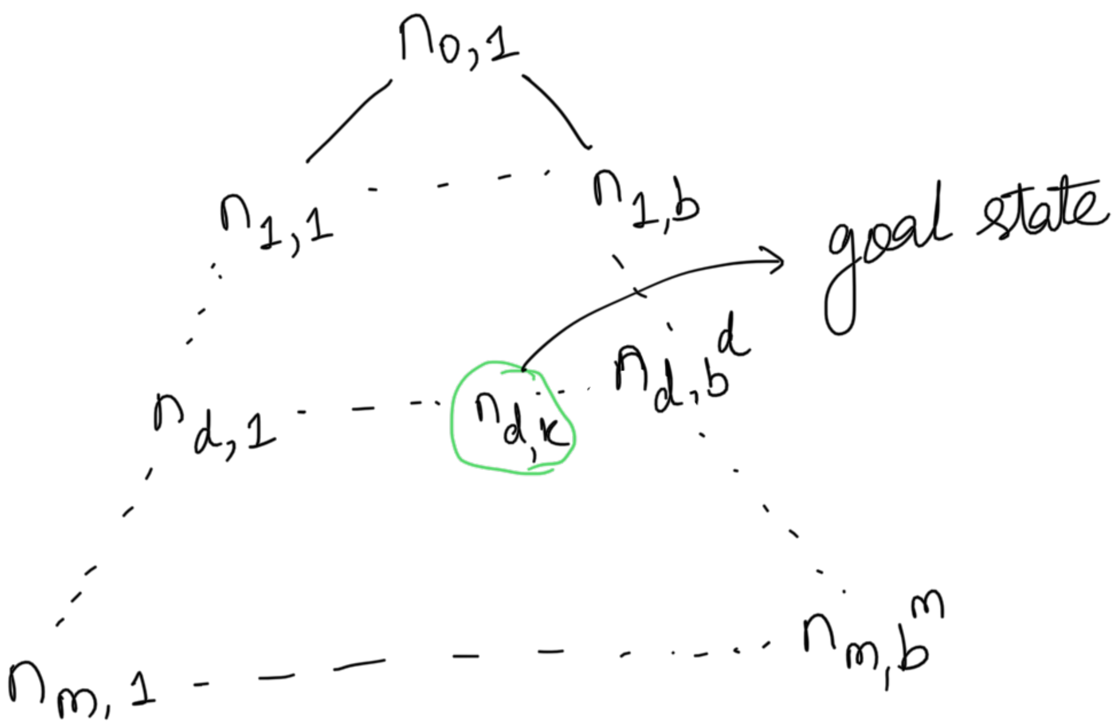
node traversal = { A, Z, AC, ZE, ACD, ZEF, AD, ZEFD }

costs: 0, 0, 2, 2, 3, 3, 4, 4

solution path = ACDFEZ

total cost = cost (ACD) + cost (ZEFD) = 7

Q6 Let the goal state in a tree of branching factor b, and height m be at a depth d ($d \leq m$)



number of depth iterations to reach depth d = d

number of nodes visited in 0^{th} iter = 1

number of nodes visited in 1^{st} iter = $1+b$

" in 2^{nd} iter = $1+b+b^2$

⋮

" in d^{th} iter = $\sum_{i=0}^{d} b^i$

$\therefore$ total nodes visited

$$= 1 + (1+b) + (1+b+b^2) + \dots + (1+b+\dots+b^d)$$

$$= b^d + 2b^{d-1} + \dots + (d+1)$$

$$= b^d \underbrace{\left(1 + \frac{2}{b} + \frac{3}{b^2} + \dots + \frac{(d+1)}{b^d}\right)}$$

↳ converges for asymptomatic bounds and $b > 1$

$\Rightarrow$ total nodes visited (time complexity) $= b^d k$

$$= O(b^d)$$

(for $b > 1$)