

COEN 266

HW 2 Part 1

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Problem 1:

a)



b) BFS:  $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8 \rightarrow 9 \rightarrow 10 \rightarrow 11$

depth-limited search with  $l=3$

$1 \rightarrow 2 \rightarrow 4 \rightarrow 8 \rightarrow 9 \rightarrow 5 \rightarrow 10 \rightarrow 11$

iterative deepening search:

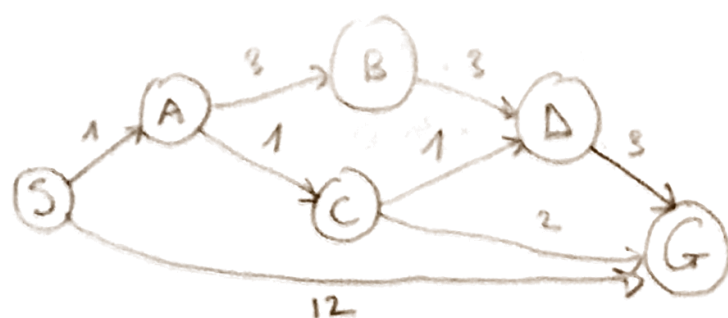
$l=0$  1

$l=1$   $1 \rightarrow 2 \rightarrow 3$

$l=2$   $1 \rightarrow 2 \rightarrow 4 \rightarrow 5 \rightarrow 3 \rightarrow 6 \rightarrow 7$

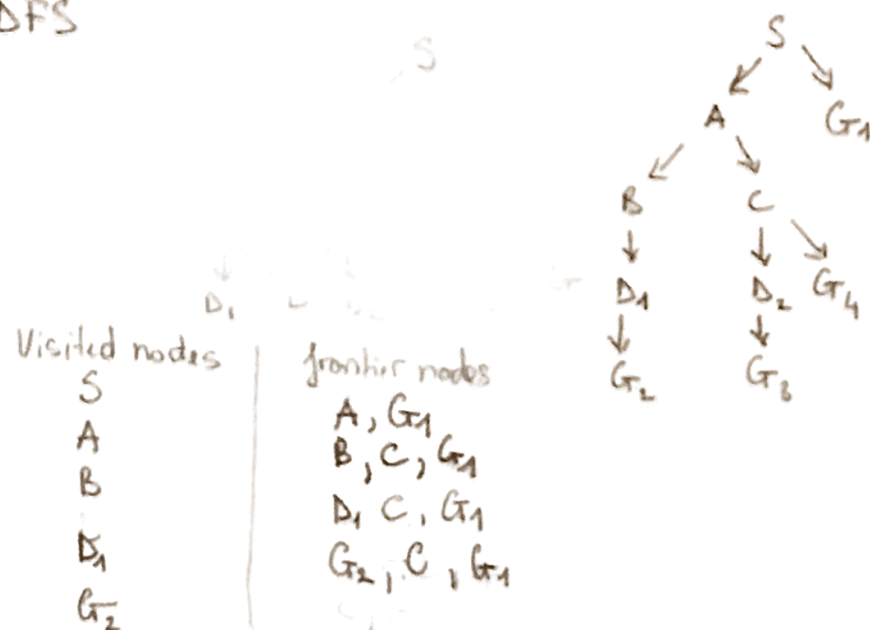
$l=3$   $1 \rightarrow 2 \rightarrow 4 \rightarrow 8 \rightarrow 9 \rightarrow 5 \rightarrow 10 \rightarrow 11$

# Problem 2



state	$h(n)$
S	4
A	2
B	6
C	1
D	3
G	0

a) DFS



\* Notes:

$$D_1 = D_2$$

$$G_1 = G_2 = G_3 = G$$

Order of node expansion: S, A, B, D<sub>1</sub>, G<sub>2</sub>

Path found: S → A → B → D<sub>1</sub> → G<sub>2</sub>

Cost of path found: 10

## b) Uniform cost search

visited nodes      frontier priority queue

S

A, G

A

C, B, G

C

D, G, B

D

G, B

B

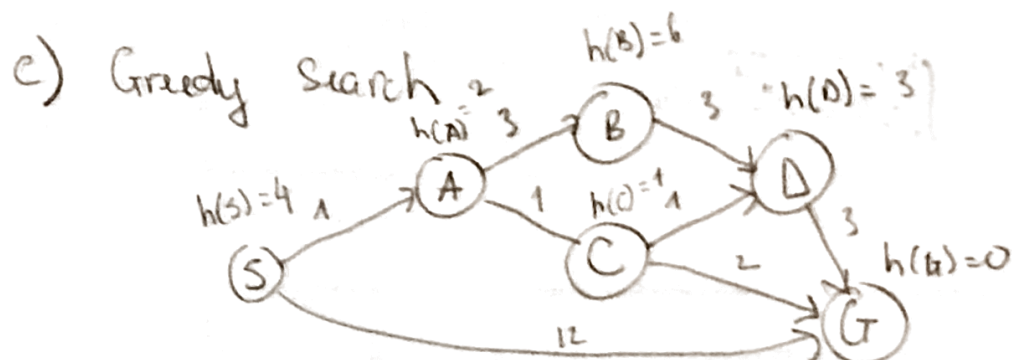
G

G

Order of nodes expansion: S, A, C, D, B, G

path found: S → A → C → G

path cost: 4



visited nodes

S

G

frontier nodes

G, A

Order of node expansion: S, G

path found: S → G

path cost: 12

d) iterative deepening BFS



$l=0$

S

visited nodes

S

frontier

$\emptyset$

$l=1$



S

A

G

A, G

G

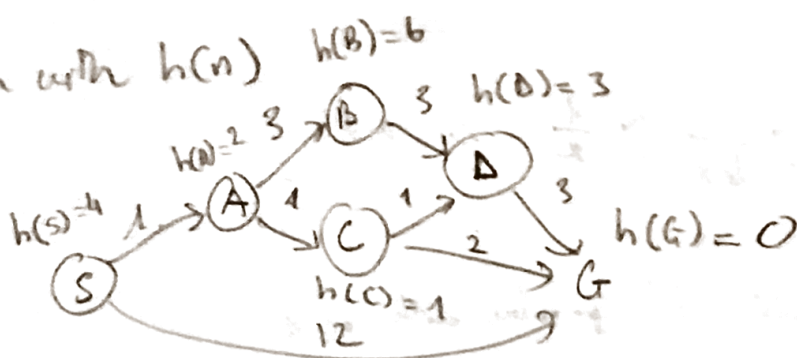
$\emptyset$

order of node expansion: S, S, A, G

path found: S  $\rightarrow$  G

path cost: 12

e) A\* search with  $h(n)$



visited nodes

S

A

C

G

frontier

A, G

B, C, G

B, D, G

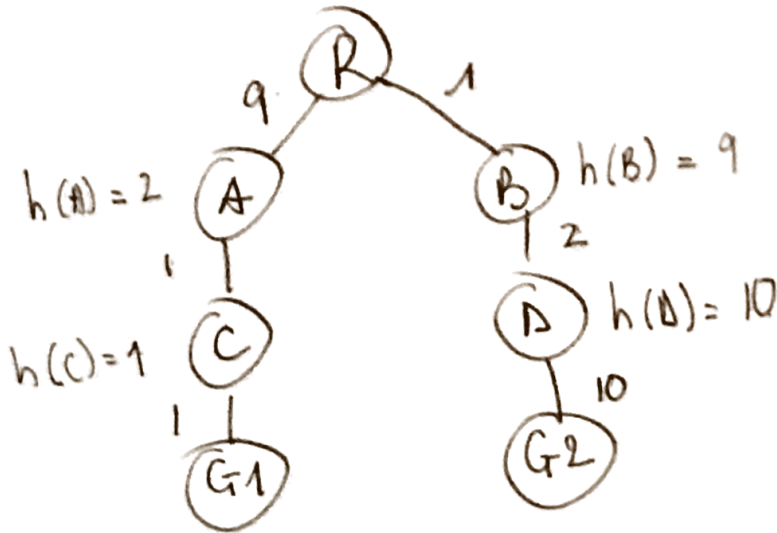
order of node expansion

S, A, C, G

path found: S  $\rightarrow$  A  $\rightarrow$  C  $\rightarrow$  G

path cost: 4

# Problem 3:



Visited nodes

R

B

A

C

G<sub>1</sub>

frontier nodes

A, B

A, D

D, C

D, G<sub>1</sub>

$$f_A(n) = 9 + 2 = 11$$

$$f_B(n) = 9 + 2 = 11$$

$$f_D(n) = 13$$

$$f_{G_1}(n) = 13$$

$$f_B(n) = 9 + 1 = 10$$

$$f_A(n) = 1 + 2 + 10 = 13$$

$$f_C(n) = 9 + 1 + 1 = 11$$

$$f_{G_1}(n) = 9 + 1 + 1 + 10 = 11$$

Solution path:  $R \rightarrow A \rightarrow C \rightarrow G_1$