Midterm AI 131

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Q1

a) False, if you hit a goal node and it is the same or better cost as other locations and no negative costs are allowed you can stop based on L→R convention/tie breaker preference. You must continue if a goal node cost is > frontier nodes.

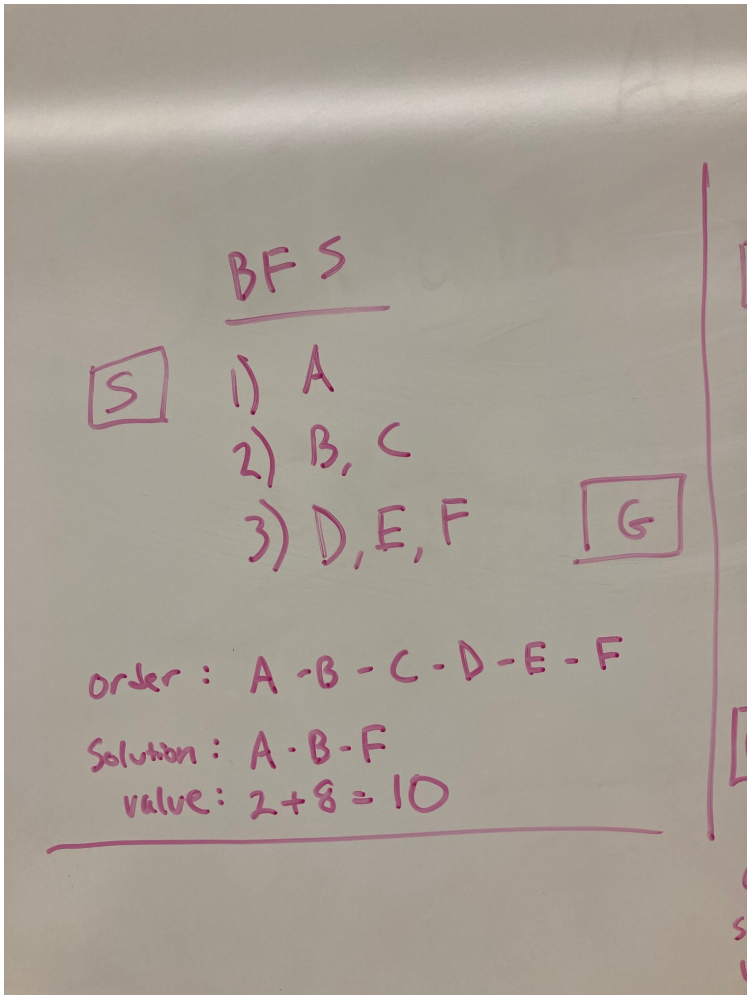
b) True, this wont give a better solution and violates how A* works. In Q2, once we hit N=9, we stop and dont look at (F, 10) at the front of the priority queue.

c) True, for hw02 calculating all neighbors and intersections does work, but it is generally a lot worse for development if the user does not go off rules but rather manually writes out combos.

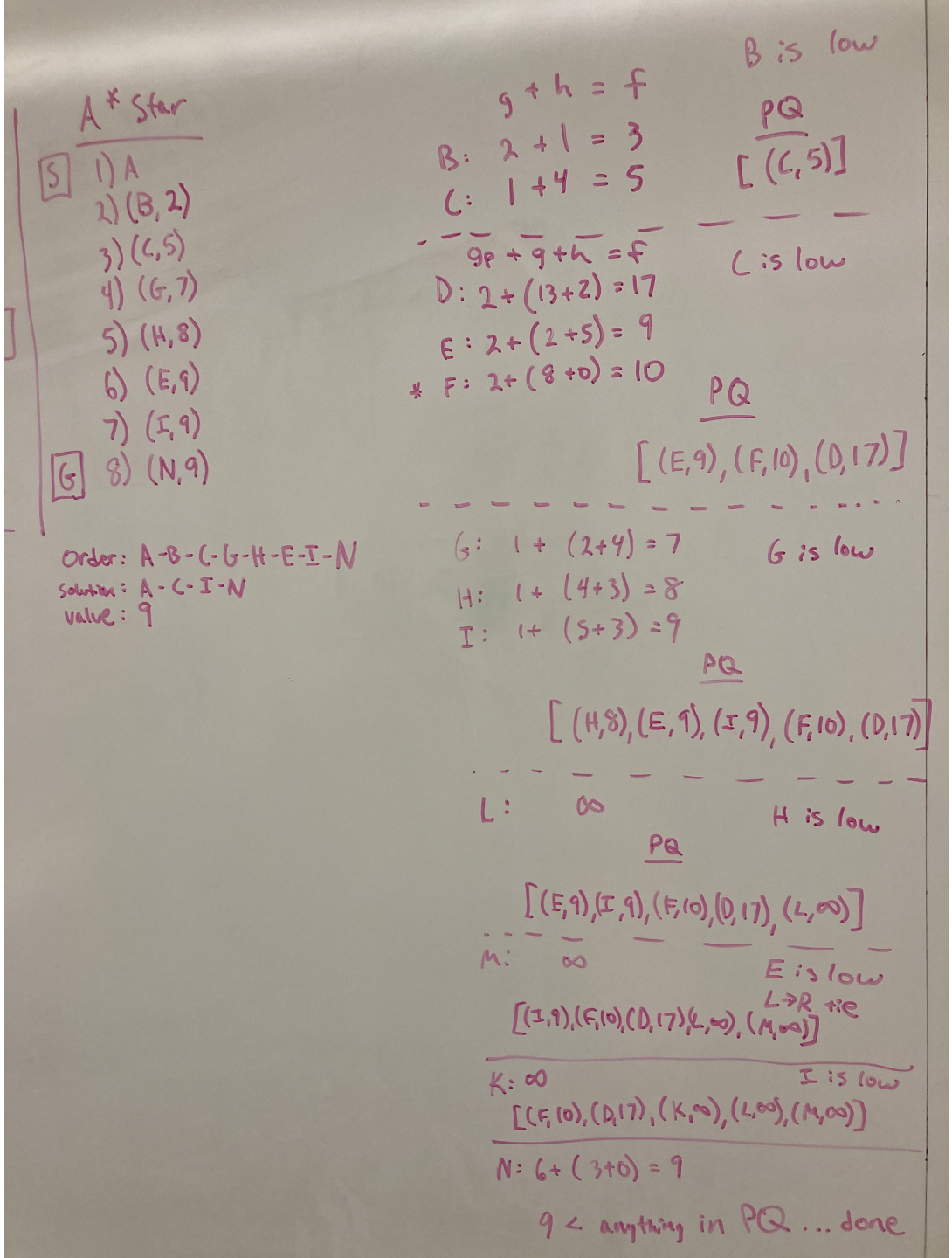
d) False $KB \vdash \alpha$

If we dont know that KB entails α then it is not complete. Completeness only happens when when models of α are entailed w/in KB.

Q2 BFS

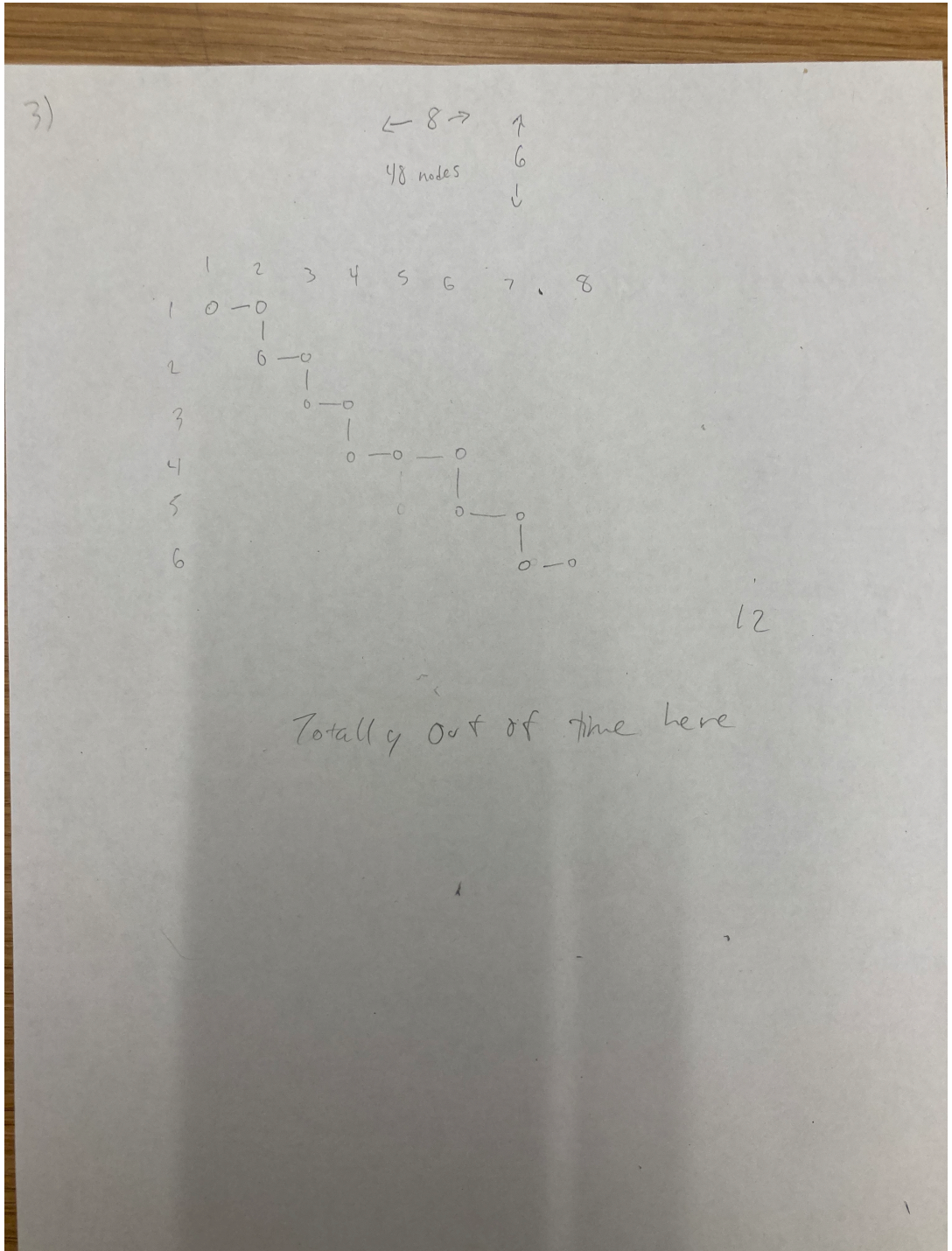


Q2 A* Star


A* Star
S 1) A
2) (B, 2)
3) (C, 5)
4) (G, 7)
5) (H, 8)
6) (E, 9)
7) (I, 9)
G 8) (N, 9)
Order: A-B-C-G-H-E-I-N
solution: A-C-I-N
value: 9
g + h = f
B: 2 + 1 = 3
C: 1 + 4 = 5
B is low
PQ
[(C, 5)]
C is low
gp + g + h = f
D: 2 + (13 + 2) = 17
E: 2 + (2 + 5) = 9
* F: 2 + (8 + 0) = 10
PQ
[(E, 9), (F, 10), (D, 17)]
G: 1 + (2 + 4) = 7
G is low
H: 1 + (4 + 3) = 8
I: 1 + (5 + 3) = 9
PQ
[(H, 8), (E, 9), (I, 9), (F, 10), (D, 17)]
L: ∞
H is low
PQ
[(E, 9), (I, 9), (F, 10), (D, 17), (L, ∞)]
M: ∞
E is low
L→R tie
[(I, 9), (F, 10), (D, 17), (L, ∞), (M, ∞)]
K: ∞
I is low
[(F, 10), (D, 17), (K, ∞), (L, ∞), (M, ∞)]
N: 6 + (3 + 0) = 9
9 < anything in PQ ... done

Q3

3)



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Totally out of time here

Q4 CSP

Variables:

Timeslots {1…t}
Classes {1…c}
Classrooms {1…r}
Instructors {1…i}

total variables = t * c * r * i

Constraints

Given a specific timeslot and classroom, there may only be 1 instructor and 1 class

t_1, c_1, r_1, i_1 =/= $t_1, r_1, c_{2…n}, i_{2…n}$
t_1, c_1, r_2, i_2 =/= $t_1, r_1, c_{1,3…n}, i_{1,3…n}$

Keeping timeslot and classroom as controls, it is not possible to have any other instructor or any other class in the same classroom at the same time

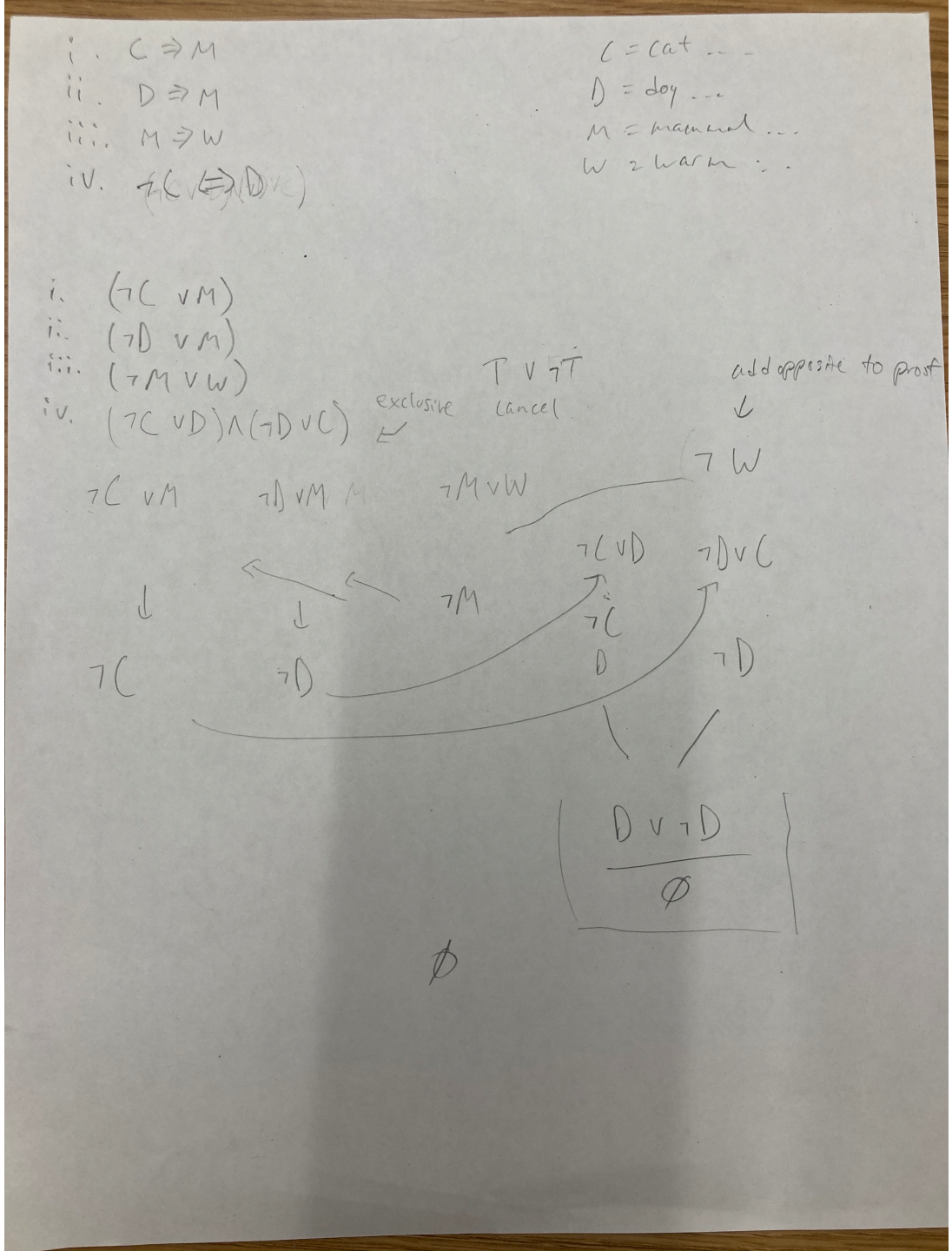
Given a specific class and time, instructors can't match
@ (t_1, c_1) i_1 =/= $i_{2…n}$
Instructor 1 can't be any other instructor

Given a specific class and time, classrooms can't match
@ (t_1, c_1) r_1 =/= $r_{2…n}$
classroom 1 can't be any other classroom

At each timeslot we must have enough classrooms for all the classes taking place
@ $t_{1…n}$ ($r_{1…n}$ >= $c_{1…n}$)
r indicates # of classrooms
c indicates # of classes

There must be enough instructors at each timeslot to teach each class
@ $t_{1…n}$ ($i_{1…n}$ >= $c_{1…n}$)
i indicates # of instructors
c indicates # of classes

Q5 Logic


i. C ⇒ M
ii. D ⇒ M
iii. M ⇒ W
iv. ¬(C ⇔ (D ∨ C))
C = cat ...
D = dog ...
M = mammal ...
W = warm ...
i. (¬C ∨ M)
ii. (¬D ∨ M)
iii. (¬M ∨ W)
iv. (¬C ∨ D) ∧ (¬D ∨ C)
exclusive
T ∨ ¬T
cancel
add opposite to prof
¬W
¬C ∨ M
¬D ∨ M
¬M ∨ W
¬C ∨ D
¬D ∨ C
¬M
¬C
D
¬C
¬D
¬D
D ∨ ¬D
∅
∅