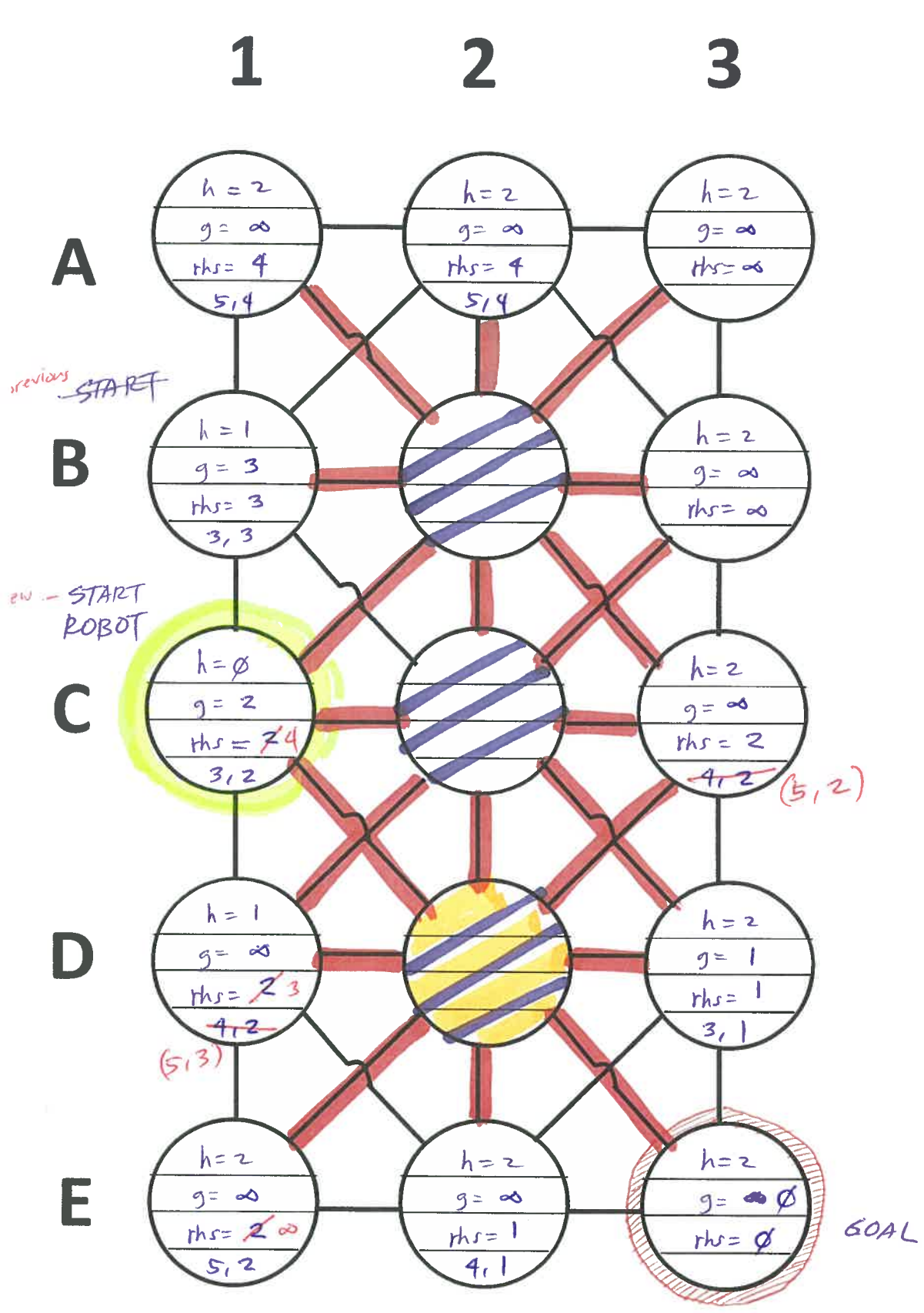
2015



REPLANNING
STEP ∅

The robot moves to cell C1 & cell D2 is detected to be blocked.

KEPLANNING

STEP	DEQ						
∅		A1 g=∞ rhs=4 5,4	A2 g=∞ rhs=4 5,4	D1 g=∞ rhs=2 4,2	C3 g=∞ rhs=2 4,2	E2 g=∞ rhs=1 4,1	E1 g=∞ rhs=2 5,2

s_{START} = min successor s' with $c(s', start)+g(s$

= C1

move to s_{START} = C1

Scan for changed edge costs :

if edge costs changed,

$km = km + h(s_{LAST}, s_{START})$

$= \emptyset + 1 = 1$

Affected nodes due to edge costs change,

C1, C3, D1, D3, E1, E2, E3

updateVertex (C1):

rhs = 3+1 = 4

Insert (3, 2) = key is still the same as before but the calculations show that the h-value & km variables have changed

2+0+1 = 3

updateVertex (C3):

rhs = 1+1 = 2

remove, insert back (5, 2)

2+2+1

updateVertex (D1):

rhs = 2+1 = 3

remove, insert back (5, 3)

3+1+1

Continuation of STEP	DEQ	ENQ
∅		C1 g=2 rhs=4 3,2 ~~C3 g=∞ rhs=2 5,2~~ D1 g=∞ rhs=3 5,3 E2 g=∞ rhs=1 4,1 A1 g=∞ rhs=4 5,4 A2 g=∞ rhs=4 5,4

updateVertex(D3)

rhs = 0+1 = 1

consistent already

UpdateVertex(E1)

rhs = ∞+1 = ∞

remove

consistent already

UpdateVertex(E2)

rhs = ∅+1 = 1

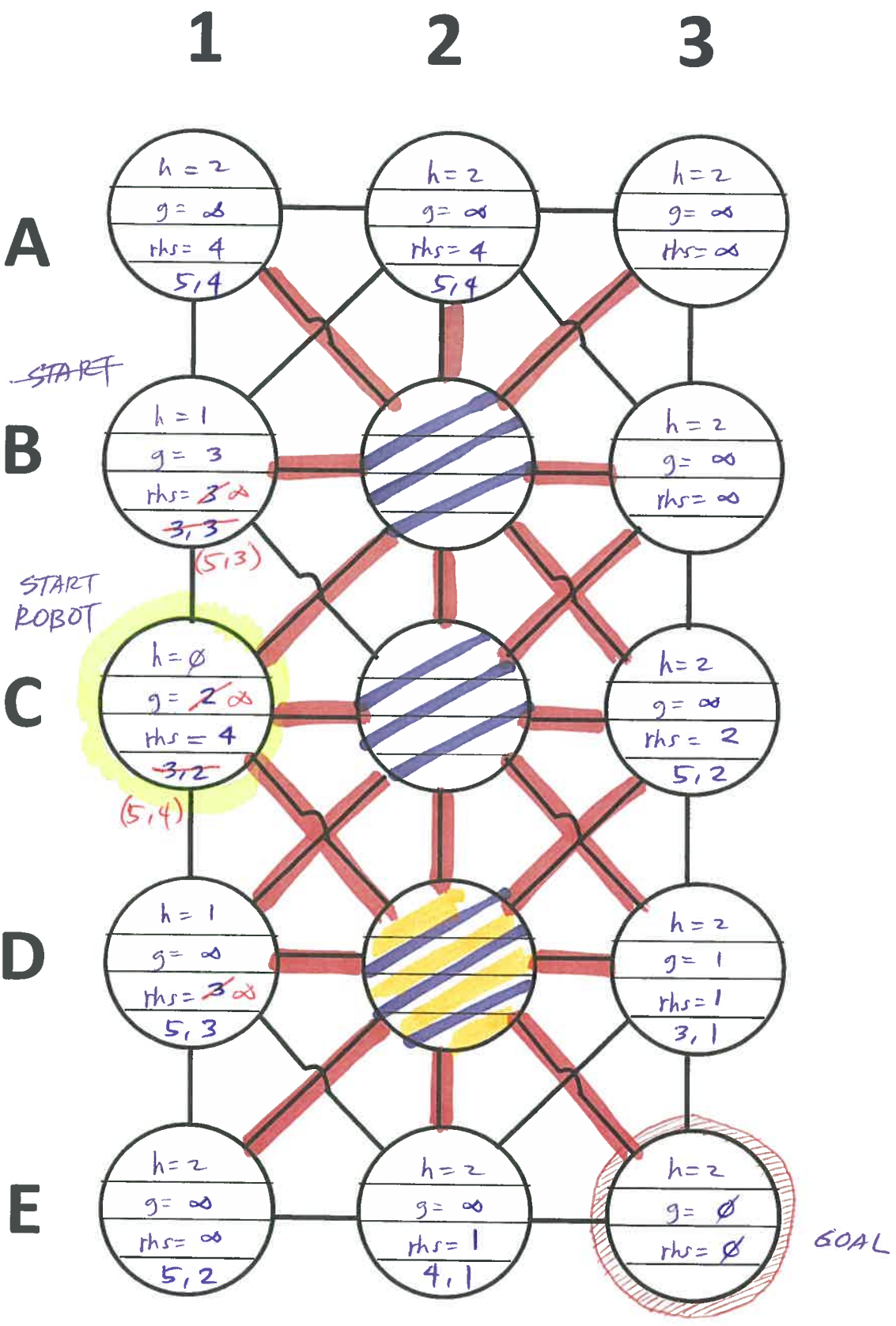
remove, insert (4, 1)

1+2+1

UpdateVertex(E3)

Goal! don't update rhs

consistent already



REPLANNING

STEP 1

STEP	DEQ	ENQ
1	C1 g = ~~2~~ ∞ rhs = 4 3, 2	

$(3,2) < (3,2)$ or $rhs(start) \neq g(start)$

$4 \neq 2$

false or true

$k_{old} = (3,2)$

$g \leq rhs$

$g = \infty$

$pred(C1) \cup \{C1\} : B1, D1, C1$

updateVertex (B1)

$rhs = \infty + 1 = \infty$

Insert ~~(5, 3)~~ $3+1+1$

updateVertex (D1)

$rhs = \infty + 1 = \infty$

remove

consistent already

updateVertex (C1)

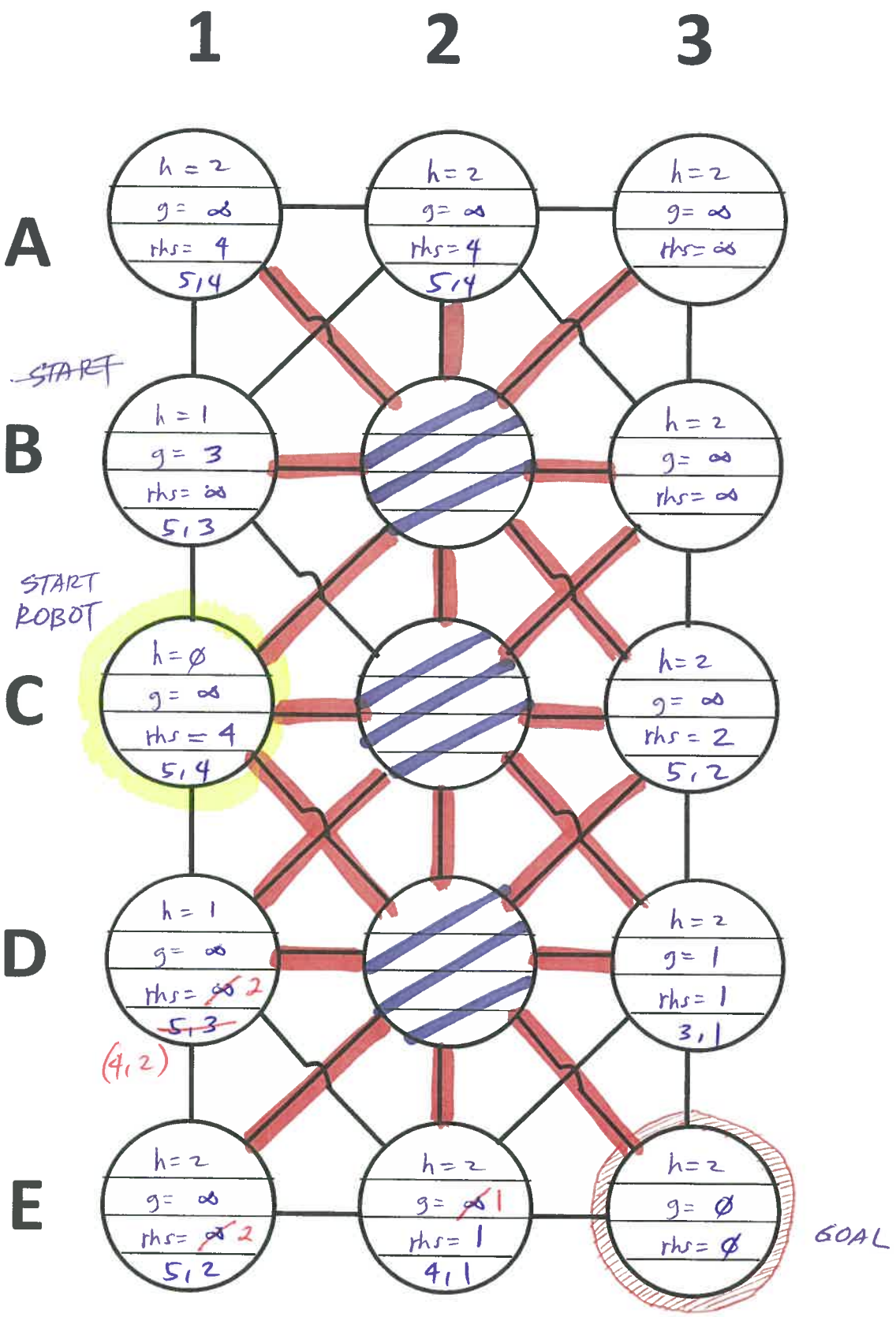
$rhs = 3 + 1 = 4$

Insert (5, 4)

$4+0+1$

Queue

(B1, g = 3, rhs = ∞, 5,3) (C1, g = ∞, rhs = 4, 5,4) (C3, g = ∞, rhs = 2, 5,2) ~~(E2, g = ∞, rhs = 1, 4,1)~~ (A1, g = ∞, rhs = 4, 5,4) (A2, g = ∞, rhs = 4, 5,4)


1
2
3
A
B
C
D
E
START
START ROBOT
h = 2
g = ∞
rhs = 4
5,4
h = 2
g = ∞
rhs = 4
5,4
h = 2
g = ∞
rhs = ∞
h = 1
g = 3
rhs = ∞
5,3
h = 2
g = ∞
rhs = ∞
h = ∅
g = ∞
rhs = 4
5,4
h = 2
g = ∞
rhs = 2
5,2
h = 1
g = ∞
rhs = ∞ 2
5,3
(4,2)
h = 2
g = 1
rhs = 1
3,1
h = 2
g = ∞
rhs = ∞ 2
5,2
h = 2
g = ∞ 1
rhs = 1
4,1
h = 2
g = ∅
rhs = ∅
GOAL

STEP 2

STEP	DEQ	ENQ
2	E2 g = ~~∞~~ 1 rhs = 1 4, 1	

$(4,1) < (5,4)$ or $rhs(start) \neq g(start)$

$4 \neq \infty$

true or true

kold = (4,1)

~~k~~ (4,1)

if (kold < calcKey (E2)

(4, 1)

1 + 2 + 1

g > rhs

pred (E2) : D1, D3, E1, E3

updateVertex (D1)

rhs = 1 + 1 = 2

Insert (4, 2) 2 + 1 + 1

updateVertex (D3)

rhs = ∞ + 1 = 1

consistent

UpdateVertex (E1)

rhs = 1 + 1 = 2 2 + 2 + 1

Insert (5, 2)

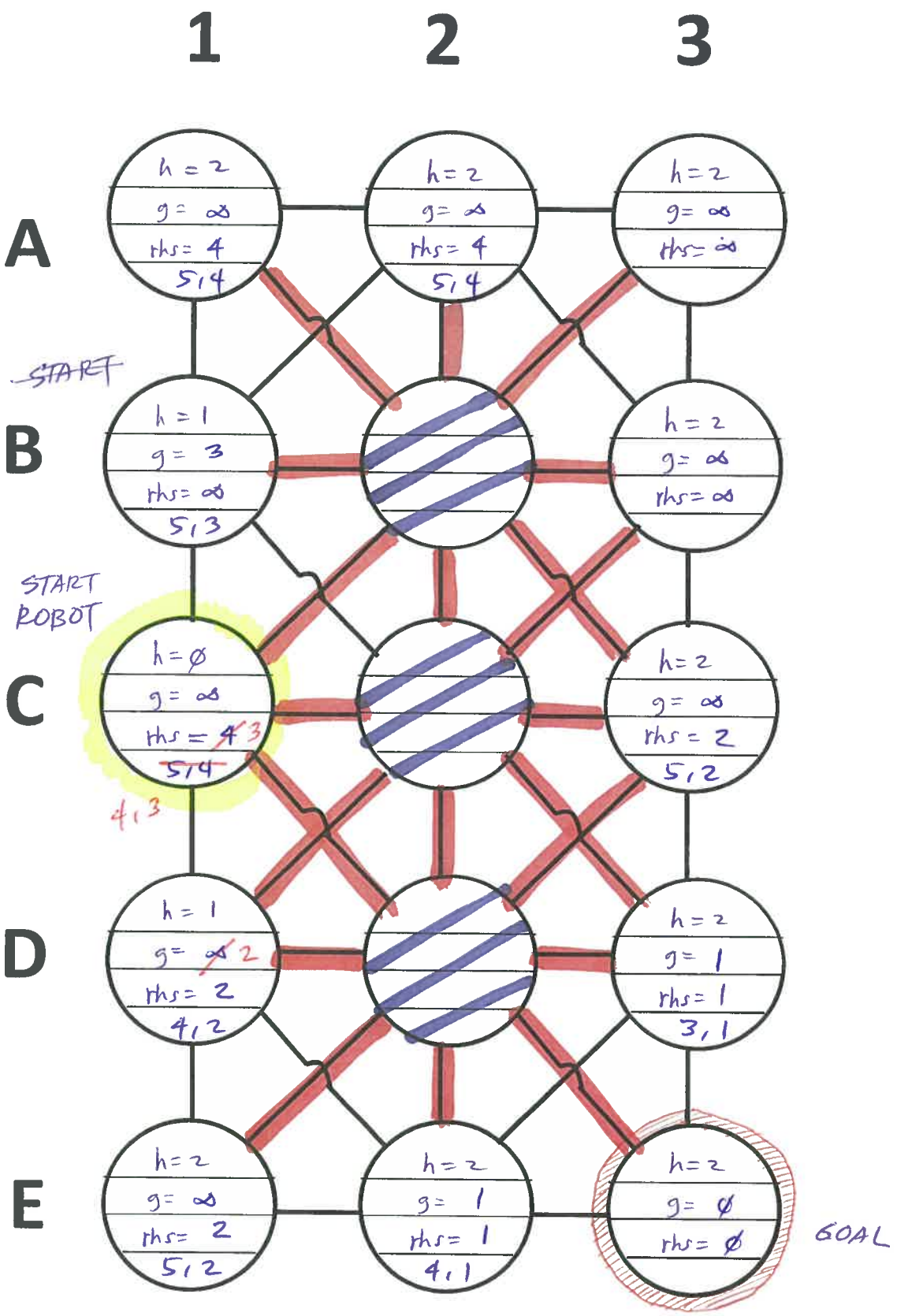
UpdateVertex (E3)

Good! dont update rhs

consistent already

D1	E1	B1	C1	C3	A1	A2
g = ∞	g = ∞	g = 3	g = ∞	g = ∞	g = ∞	g = ∞
rhs = 2	rhs = 2	rhs = ∞	rhs = 4	rhs = 2	rhs = 4	rhs = 4
4, 2	5, 2	5, 3	5, 4	5, 2	5, 4	5, 4

4


1
2
3
A
B
C
D
E
START
START ROBOT
GOAL
h = 2
g = ∞
rhs = 4
5,4
h = 2
g = ∞
rhs = 4
5,4
h = 2
g = ∞
rhs = ∞
h = 1
g = 3
rhs = ∞
5,3
h = 2
g = ∞
rhs = ∞
h = ∅
g = ∞
rhs = 4 3
5,4
4,3
h = 2
g = ∞
rhs = 2
5,2
h = 1
g = ∞ 2
rhs = 2
4,2
h = 2
g = 1
rhs = 1
3,1
h = 2
g = ∞
rhs = 2
5,2
h = 2
g = 1
rhs = 1
4,1
h = 2
g = ∅
rhs = ∅

STEP 3

STEP	DEQ	ENQ
3	(D1 g=∞ ~~2~~ rhs=2 4,2)	

$(4,2) < (5,4)$ or $rhs(start) \neq g(start)$

$4 \neq \infty$

true or true

kold = 4, 2

if (kold < calcKey(D1))

(4, 2)

2 + 1 + 1

pred (D1): C1, E1, E2

updateVertex(C1)

rhs = 2 + 1 = 3

remove, insert back (4, 3) — 3 + 0 + 1

updateVertex(E1)

rhs = 1 + 1 = 2

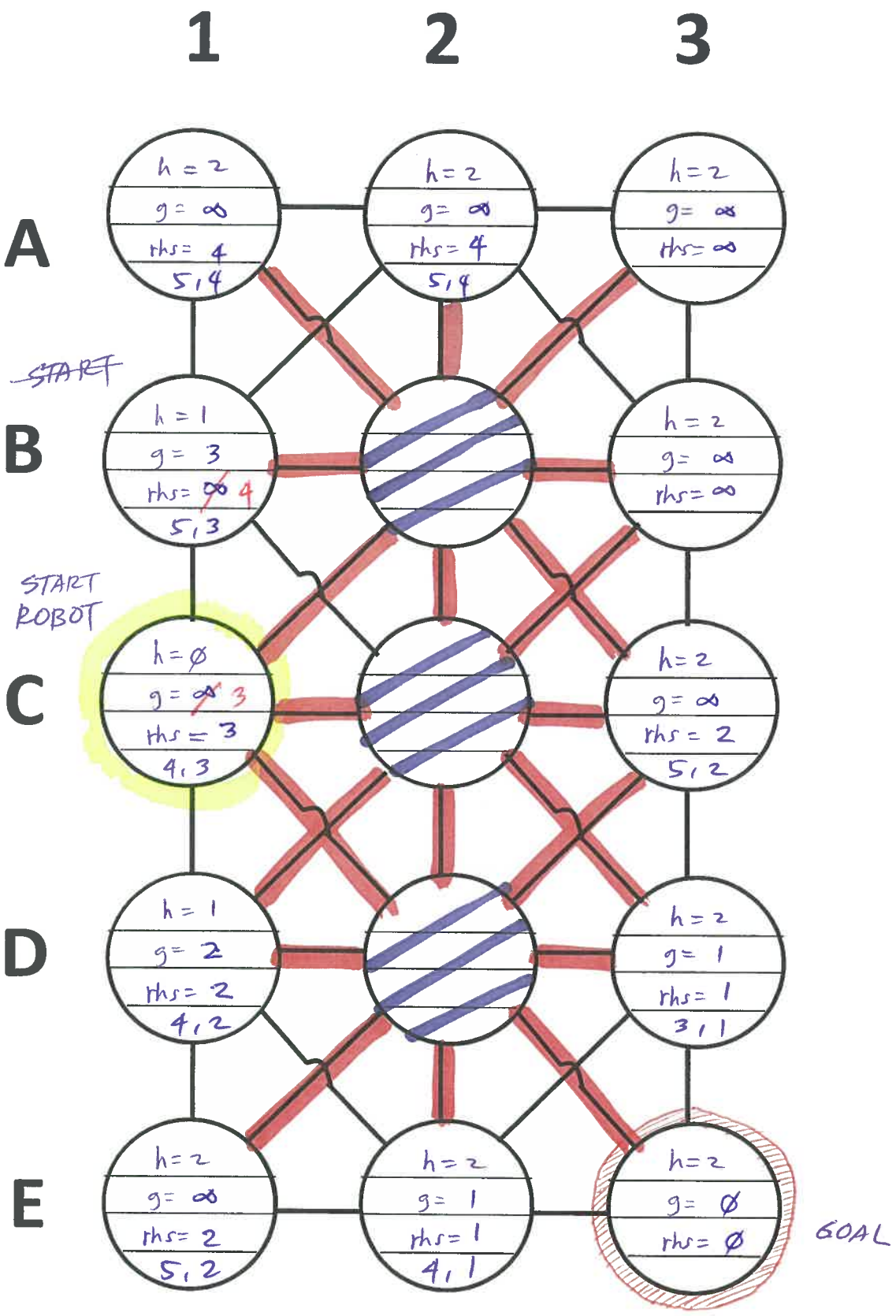
remove, insert back (5, 2) — 2 + 2 + 1

updateVertex(E2)

rhs = 0 + 1 = 1

consistent already

~~(C1 g=∞ rhs=3 4,3)~~ (E1 g=∞ rhs=2 5,2) (B1 g=3 rhs=∞ 5,3) (C3 g=∞ rhs=2 5,2) (A1 g=∞ rhs=4 5,4) (A2 g=∞ rhs=4 5,4)


1
2
3
A
B
C
D
E
START
START ROBOT
h = 2
g = ∞
rhs = 4
5,4
h = 2
g = ∞
rhs = 4
5,4
h = 2
g = ∞
rhs = ∞
h = 1
g = 3
rhs = ∞ 4
5,3
h = 2
g = ∞
rhs = ∞
h = ∅
g = ∞ 3
rhs = 3
4,3
h = 2
g = ∞
rhs = 2
5,2
h = 1
g = 2
rhs = 2
4,2
h = 2
g = 1
rhs = 1
3,1
h = 2
g = ∞
rhs = 2
5,2
h = 2
g = 1
rhs = 1
4,1
h = 2
g = ∅
rhs = ∅
GOAL

STEP 4

STEP	DEQ	ENQ
4	C1 g = ~~∞~~ 3 rhs = 3 4,3	

$(4,3) < (4,3)$ OR $rhs(start) \neq g(start)$

$3 \neq \infty$

false OR true = true ✓

kold = (4,3)

if (kold < calcKey(C1))

(4,3) (4,3) 3+0+1

pred(C1) : B1, D1

updateVertex(B1)

rhs = 3+1 = 4 3+1+1

remove, insert (5,3)

updateVertex(D1)

rhs = 1+1 = 2

consistent already

Queue

B1	E1	C3	A1	A2
g = 3	g = ∞	g = ∞	g = ∞	g = ∞
rhs = 4	rhs = 2	rhs = 2	rhs = 4	rhs = 4
5,3	5,2	5,2	5,4	5,4

STEP	DEQ	ENQ
5		

$(5,2) < (4,3)$ or $rhs(start) \neq g(start)$

false OR $3 \neq 3$

false = false

FIN.