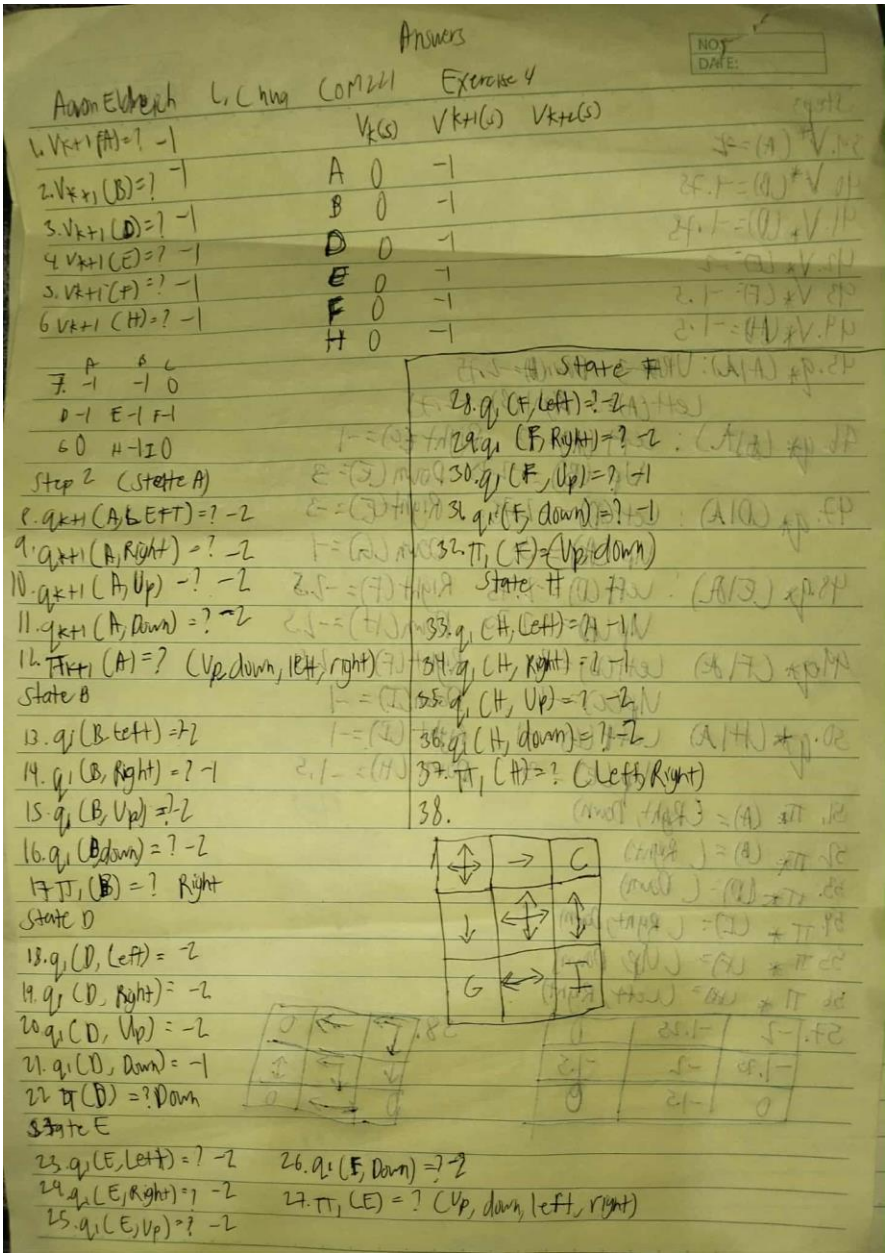
Exercise 4

Answers



Steps

39. $V^*(A) = -2$

40. $V^*(B) = -1.75$

41. $V_*(D) = -1.75$

42. $V_*(E) = -2$

43. $V_*(F) = -1.5$

44. $V_*(H) = -1.5$

45. $q_*(A, \text{Up}) = -3$ Down(A) $= -2.75$
Left(A) $= -3$ Right(B) $= -2.75$

46. $q_*(B, \text{Up})$: Left(A) $= -3$, Right(C) $= -1$
Up(B) $= -2.75$ Down(E) $= -3$

47. $q_*(D, \text{Up})$: Left(D) $= -2.75$, Right(E) $= -3$
Up(A) $= -3$ Down(G) $= -1$

48. $q_*(E, \text{Up})$: Left(D) $= -2.75$ Right(F) $= -2.5$
Up(B) $= -2.75$ Down(H) $= -2.5$

49. $q_*(F, \text{Up})$ Left(D) $= -3$ Right(F) $= -2.5$
Up(C) $= -1$ Down(I) $= -1$

50. $q_*(H, \text{Up})$ Left(G) $= -1$ Right(I) $= -1$
Up(E) $= -3$ Down(H) $= -1.5$

51. $\pi_*(A) =$ (Right, Down)

52. $\pi_*(B) =$ (Right)

53. $\pi_*(D) =$ (Down)

54. $\pi_*(E) =$ (Right, Down)

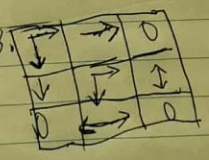
55. $\pi_*(F) =$ (Up, Down)

56. $\pi_*(H) =$ (Left, Right)

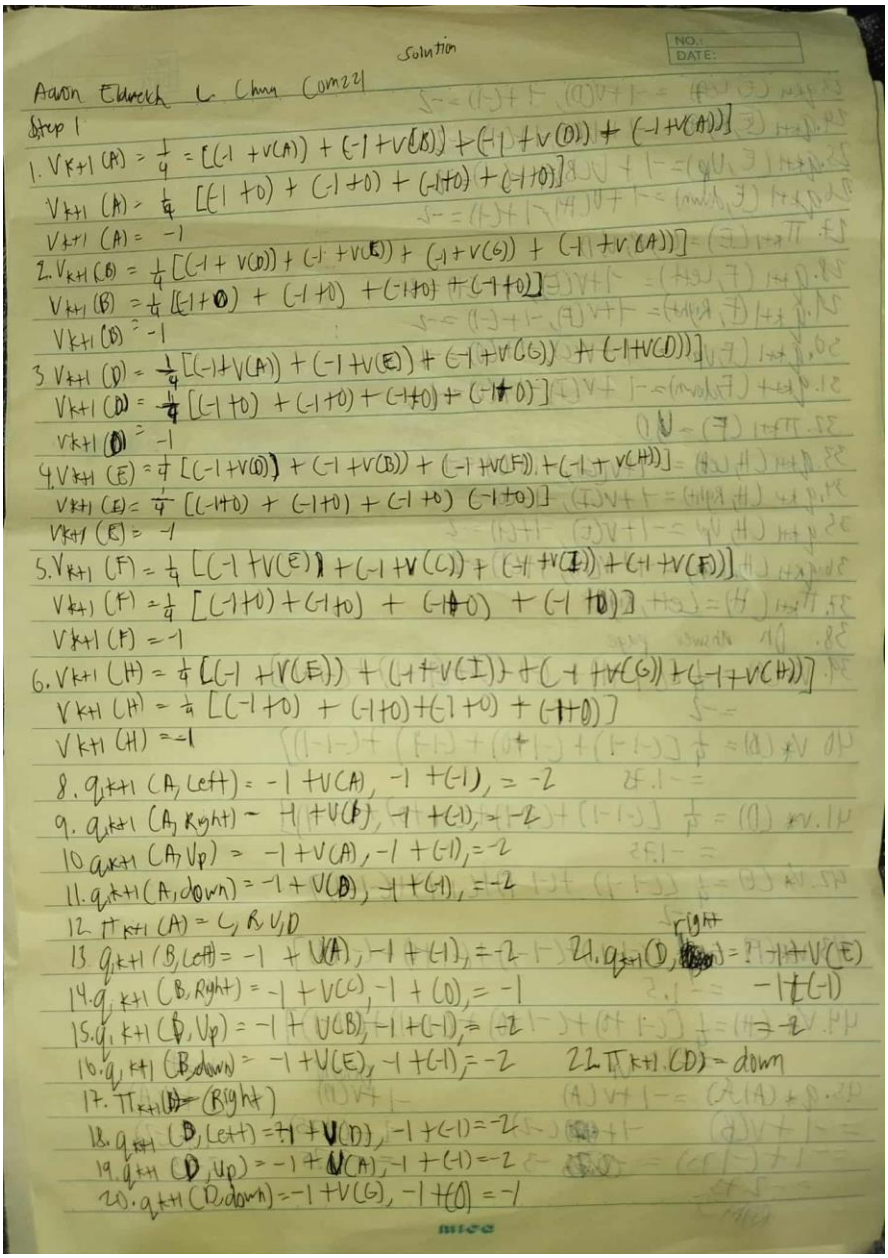
57.

-2	-1.25	0
-1.75	-2	-1.5
0	-1.5	0

58.



Solutions



Solution

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Aaron Edwards & Chris Comzel

Step 1

1. $V_{k+1}(A) = \frac{1}{4}[(-1+V(A)) + (-1+V(B)) + (-1+V(D)) + (-1+V(A))]$

$V_{k+1}(A) = \frac{1}{4}[(-1+0) + (-1+0) + (-1+0) + (-1+0)]$

$V_{k+1}(A) = -1$

2. $V_{k+1}(B) = \frac{1}{4}[(-1+V(D)) + (-1+V(E)) + (-1+V(G)) + (-1+V(A))]$

$V_{k+1}(B) = \frac{1}{4}[(-1+0) + (-1+0) + (-1+0) + (-1+0)]$

$V_{k+1}(B) = -1$

3. $V_{k+1}(D) = \frac{1}{4}[(-1+V(A)) + (-1+V(E)) + (-1+V(G)) + (-1+V(D))]$

$V_{k+1}(D) = \frac{1}{4}[(-1+0) + (-1+0) + (-1+0) + (-1+0)]$

$V_{k+1}(D) = -1$

4. $V_{k+1}(E) = \frac{1}{4}[(-1+V(D)) + (-1+V(B)) + (-1+V(F)) + (-1+V(H))]$

$V_{k+1}(E) = \frac{1}{4}[(-1+0) + (-1+0) + (-1+0) + (-1+0)]$

$V_{k+1}(E) = -1$

5. $V_{k+1}(F) = \frac{1}{4}[(-1+V(E)) + (-1+V(C)) + (-1+V(I)) + (-1+V(F))]$

$V_{k+1}(F) = \frac{1}{4}[(-1+0) + (-1+0) + (-1+0) + (-1+0)]$

$V_{k+1}(F) = -1$

6. $V_{k+1}(H) = \frac{1}{4}[(-1+V(E)) + (-1+V(I)) + (-1+V(G)) + (-1+V(H))]$

$V_{k+1}(H) = \frac{1}{4}[(-1+0) + (-1+0) + (-1+0) + (-1+0)]$

$V_{k+1}(H) = -1$

8. $q_{k+1}(A, \text{Left}) = -1 + V(A), -1 + (-1), = -2$

9. $q_{k+1}(A, \text{Right}) = -1 + V(B), -1 + (-1), = -2$

10. $q_{k+1}(A, \text{Up}) = -1 + V(A), -1 + (-1), = -2$

11. $q_{k+1}(A, \text{down}) = -1 + V(B), -1 + (-1), = -2$

12. $\Pi_{k+1}(A) = L, R, U, D$

13. $q_{k+1}(B, \text{Left}) = -1 + V(A), -1 + (-1), = -2$

14. $q_{k+1}(B, \text{Right}) = -1 + V(C), -1 + (0), = -1$

15. $q_{k+1}(B, \text{Up}) = -1 + V(B), -1 + (-1), = -2$

16. $q_{k+1}(B, \text{down}) = -1 + V(E), -1 + (-1), = -2$

17. $\Pi_{k+1}(B) = (\text{Right})$

18. $q_{k+1}(D, \text{Left}) = -1 + V(D), -1 + (-1) = -2$

19. $q_{k+1}(D, \text{Up}) = -1 + V(A), -1 + (-1) = -2$

20. $q_{k+1}(D, \text{down}) = -1 + V(G), -1 + (0) = -1$

21. $q_{k+1}(D, \text{Right}) = -1 + V(E)$

$-1 + (-1)$

$= -2$

22. $\Pi_{k+1}(D) = \text{down}$

23. $q_{k+1}(E, \text{Left}) = -1 + V(D), -1 + (-1) = -2$

24. $q_{k+1}(E, \text{Right}) = -1 + V(F), -1 + (-1) = -2$

25. $q_{k+1}(E, \text{Up}) = -1 + V(B), -1 + (-1) = -2$

26. $q_{k+1}(E, \text{down}) = -1 + V(H), -1 + (-1) = -2$

27. $\pi_{k+1}(E) = (L, R, U, D)$

28. $q_{k+1}(F, \text{Left}) = -1 + V(E), -1 + (-1) = -2$

29. $q_{k+1}(F, \text{Right}) = -1 + V(F), -1 + (-1) = -2$

30. $q_{k+1}(F, \text{Up}) = -1 + V(C), -1 + (0) = -1$

31. $q_{k+1}(F, \text{down}) = -1 + V(I), -1 + (0) = -1$

32. $\pi_{k+1}(F) = U, D$

33. $q_{k+1}(H, \text{Left}) = -1 + V(G), -1 + (0) = -1$

34. $q_{k+1}(H, \text{Right}) = -1 + V(I), -1 + (0) = -1$

35. $q_{k+1}(H, \text{Up}) = -1 + V(E), -1 + (-1) = -2$

36. $q_{k+1}(H, \text{down}) = -1 + V(H), -1 + (-1) = -2$

37. $\pi_{k+1}(H) = \text{Left}, \text{Right}$

38. On answer page

39. $V^*(A) = \frac{1}{4}[(-1 + 1) + (-1 - 1) + (-1 - 1) + (-1 + 1)]$
$= -2$

40. $V^*(D) = \frac{1}{4}[(-1 - 1) + (-1 + 0) + (-1 - 1) + (-1 - 1)]$
$= -1.75$

41. $V^*(D) = \frac{1}{4}[(-1 - 1) + (-1 - 1) + (-1 + 0) + (-1 + 1)]$
$= -1.75$

42. $V^*(E) = \frac{1}{4}[(-1 - 1) + (-1 - 1) + (-1 - 1) + (-1 - 1)]$
$= -2$

43. $V^*(F) = \frac{1}{4}[(-1 - 1) + (-1 - 1) + (-1 + 0) + (-1 + 0)]$
$= -1.5$

44. $V^*(H) = \frac{1}{4}[(-1 + 0) + (-1 + 0) + (-1 - 1) + (-1 - 1)]$
$= -1.5$

45. $q_*(A, \text{down}) = -1 + V(A)$
$= -1 + V(B)$ $\quad -1 + (-2)$
$= -1 + (-1.75) = -3$
$= -2.75$
Right

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46. $q^*(B|A)$ = Left Up
$= -1 + V(A)$ $-1 + V(B)$
$= -1 + (-2)$ $-1 + (-1.75)$
$= -3$ $= -2.75$
Right Down
$= -1 + V(C)$ $-1 + V(E)$
$-1 + (0)$ $-1 + (-2)$
$= -1$ $= -3$

47. $q^*(D|A)$ = Left Up
$= -1 + V(D)$ $-1 + V(A)$
$= -1 + (-1.75)$ $-1 + (-2)$
$= -2.75$ $= -3$
Right Down
$= -1 + V(E)$ $-1 + V(G)$
$-1 + (-2)$ $-1 + (0)$
$= -3$ $= -1$

48. $q^*(E|A)$ = Left Up
$-1 + V(D)$ $-1 + V(B)$
$-1 + (-1.75)$ $-1 + (-1.75)$
$= -2.75$ $= -2.75$
Right Down
$-1 + V(F)$ $-1 + V(H)$
$-1 + (-1.5)$ $-1 + (-1.5)$
$= -2.5$ $= -2.5$

49. $q^*(F|A)$ = Left Up
$-1 + V(D)$ $-1 + V(C)$
$-1 + (-2)$ $-1 + (0)$
$= -3$ $= -1$
Right Down
$-1 + V(F)$ $-1 + V(I)$
$-1 + (-1.5)$ $-1 + (0)$
$= -2.5$ $= -1$