Lemma 1. *Fixer has a winning strategy against Breaker in the chronicled game on the chair with superabundant list assignment L where $|L(v_1)| = 2$, $|L(v_2)| = 3$, $|L(v_3)| = 3$, $|L(v_4)| = 2$ and $|L(v_5)| = 2$.*

Proof. We show that for each possible such list assignment L on G, Fixer has a winning strategy. Up to symmetry, the following cases cover all the possible list assignments that are not an immediate win for Fixer.

Case 1. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 2. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 3. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 4. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 5. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 6. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 7. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 8. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 9. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 10. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 11. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 12. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 13. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 14. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 15. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 16. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 17. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 18. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 19. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 20. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 21. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 22. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 23. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 24. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 25. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 26. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 27. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 28. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 29. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 30. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 31. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 32. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 33. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 34. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 35. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 36. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 37. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 38. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 39. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 40. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 41. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 42. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 43. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 44. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,3\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 45. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 46. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 47. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 48. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,3\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 49. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,3\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 50. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 0 and applying Lemma 3.

Case 51. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 52. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 0 and applying Lemma 3.

Case 53. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 54. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 55. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 56. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 2 and applying Lemma 3.

Case 57. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 58. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 59. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 60. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 61. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 62. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 63. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 64. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 65. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 66. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 67. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 68. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 69. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 70. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 71. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 72. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 73. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 74. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 75. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 76. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 77. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 78. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 79. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 80. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 81. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 82. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 83. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 84. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 85. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 86. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 87. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 88. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 89. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 90. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 91. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 92. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 93. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 94. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 95. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 96. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 97. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 98. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 99. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 100. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 101. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 102. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 103. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 104. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 2 and applying Lemma 3.

Case 105. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 0 and applying Lemma 3.

Case 106. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 2 and applying Lemma 3.

Case 107. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 1 and applying Lemma 3.

Case 108. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 2 and applying Lemma 3.

Case 109. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 2 and applying Lemma 3.

Case 110. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 2 and applying Lemma 3.

Case 111. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 112. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 113. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 0 and applying Lemma 3.

Case 114. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 115. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 116. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 1 and applying Lemma 3.

Case 117. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 118. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 119. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 120. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 121. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 122. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 123. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 124. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 125. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 126. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 127. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 128. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 129. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 130. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 131. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 132. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,3\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 133. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,3\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 134. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 135. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{2,3\}$.

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Case 136. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{2,4\}$.

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Case 137. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 138. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 139. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 140. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 141. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 142. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 143. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{2,4\}$.

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Case 144. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 145. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 146. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 147. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 148. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 149. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 150. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 151. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 152. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 153. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{0,2\}$.

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Case 154. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 155. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{0,1\}$.

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Case 156. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{0,2\}$.

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Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 160. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 161. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 162. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 163. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 164. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 165. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 166. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 167. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 168. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 169. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 170. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 171. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 172. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 173. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 174. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 175. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 176. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 177. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 178. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 179. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 180. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 181. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 182. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 183. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 184. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 185. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 186. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 187. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 188. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 189. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 190. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 191. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 192. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 193. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 194. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 195. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 196. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 197. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 198. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 199. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 200. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 201. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 202. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 203. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 204. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 205. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 206. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 207. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 208. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 209. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 210. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 211. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 212. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 213. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 214. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 215. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 216. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 217. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 218. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 219. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 220. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 221. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 222. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 223. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 224. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 225. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 226. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 227. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 228. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 229. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 230. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 231. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{1, 2\}$ *and* $L(v_5) = \{2, 3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 232. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{2, 3\}$ *and* $L(v_5) = \{0, 2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 233. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{2, 3\}$ *and* $L(v_5) = \{1, 2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 234. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{2, 3\}$ *and* $L(v_5) = \{2, 3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 235. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{0, 4\}$ *and* $L(v_5) = \{0, 4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 236. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{1, 4\}$ *and* $L(v_5) = \{1, 4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 237. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 3, 4\}$, $L(v_4) = \{0, 1\}$ *and* $L(v_5) = \{3, 5\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 238. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 3, 4\}$, $L(v_4) = \{0, 2\}$ *and* $L(v_5) = \{3, 5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 239. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 3, 4\}$, $L(v_4) = \{3, 5\}$ *and* $L(v_5) = \{0, 1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 240. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 3, 4\}$, $L(v_4) = \{3, 5\}$ *and* $L(v_5) = \{0, 2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 241. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 3, 4\}$, $L(v_4) = \{3, 5\}$ *and* $L(v_5) = \{3, 5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 242. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{0, 2\}$ *and* $L(v_5) = \{3, 5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 243. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{3, 5\}$ *and* $L(v_5) = \{0, 2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 244. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{3, 5\}$ *and* $L(v_5) = \{3, 5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 245. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{4,5\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 246. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{4,5\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 247. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{4,5\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 248. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{4,5\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 249. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{4,5\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 250. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{4,5\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 251. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{4,5\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 252. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 253. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{4,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 254. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,5\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 255. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,5\}$ *and* $L(v_5) = \{0,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 256. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{4,5\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 257. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{4,5\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 258. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{4,5\}$ *and* $L(v_5) = \{4,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 259. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{4,5\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 4 and applying Lemma 3.

Case 260. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{1,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 261. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{4,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 262. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{1,5\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 263. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{1,5\}$ *and* $L(v_5) = \{1,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 264. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{4,5\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 265. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{4,5\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 266. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{4,5\}$ *and* $L(v_5) = \{4,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 267. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 268. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{2,5\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 269. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{2,5\}$ *and* $L(v_5) = \{2,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 270. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{2,5\}$ *and* $L(v_5) = \{3,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 271. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{4,5\}$ *and* $L(v_5) = \{4,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 272. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,4,5\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 273. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,4,5\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 274. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{2, 3\}$ *and* $L(v_5) = \{1, 4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 275. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{2, 3\}$ *and* $L(v_5) = \{2, 4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 276. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{2, 3\}$ *and* $L(v_5) = \{3, 4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 277. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{2, 3\}$ *and* $L(v_5) = \{4, 5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 278. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{0, 4\}$ *and* $L(v_5) = \{2, 3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 279. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{0, 4\}$ *and* $L(v_5) = \{0, 4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 280. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{1, 4\}$ *and* $L(v_5) = \{2, 3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 281. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{1, 4\}$ *and* $L(v_5) = \{1, 4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 282. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{2, 4\}$ *and* $L(v_5) = \{2, 3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 283. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{2, 4\}$ *and* $L(v_5) = \{2, 4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 284. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{2, 4\}$ *and* $L(v_5) = \{3, 4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 285. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{3, 4\}$ *and* $L(v_5) = \{2, 3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 286. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{3, 4\}$ *and* $L(v_5) = \{2, 4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 287. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{3, 4\}$ *and* $L(v_5) = \{3, 4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 288. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 4, 5\}$, $L(v_4) = \{4, 5\}$ *and* $L(v_5) = \{2, 3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 289. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,4,5\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{4,6\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 290. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,4,5\}$, $L(v_4) = \{4,6\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 291. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,4,5\}$, $L(v_4) = \{4,6\}$ *and* $L(v_5) = \{4,6\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 292. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{1,4\}$.

Let S and A_S be as in Lemma 4 using colors 2 and 4. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 2 and 4 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,4\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{0,4\}$ and $L(v_5) = \{1,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 2 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,4\}$, but then Fixer wins by Case 51. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 2 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,3\}$, $L(v_4) = \{0,4\}$ and $L(v_5) = \{1,2\}$, but then Fixer wins by Case 53.

Case 293. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,1\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,3\}$ and $L(v_5) = \{0,3\}$, but then Fixer wins by Case 80. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 3 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,3\}$, but then Fixer wins by Case 50. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 3 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,3\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 52. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 160. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 160. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 160. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_2. This results in a

position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 3 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,3\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 78. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 3 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,3\}$, but then Fixer wins by Case 69. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,3\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 78. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,3\}$, but then Fixer wins by Case 69. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 3 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,3\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 78. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 3 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,3\}$, but then Fixer wins by Case 69.

Case 294. *$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,4\}$ and $L(v_5) = \{2,4\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,4\}$ and $L(v_5) = \{2,4\}$, but then Fixer wins by Case 63. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,4\}$ and $L(v_5) = \{2,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 3 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,3\}$, $L(v_4) = \{0,4\}$ and $L(v_5) = \{2,4\}$, but then Fixer can edge-color the graph.

Case 295. *$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{1,4\}$ and $L(v_5) = \{2,4\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 4. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex

sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 216. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 216. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 104. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 104. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 104. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph.

Case 296. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 4\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 4\}$, but then Fixer wins by Case 66. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 3 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 3\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 4\}$, but then Fixer can edge-color the graph.

Case 297. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 4. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 196. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 196. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 119. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_2. This results

in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{1,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 119. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 119.

Case 298. *$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{2,4\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 4. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 218. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{2,4\}$, but then Fixer wins by Case 197. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 218. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{2,4\}$, but then Fixer wins by Case 197. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{2,4\}$, but then Fixer wins by Case 220. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{2,4\}$, but then Fixer wins by Case 106. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 120. If the components of A_S have vertex

sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 220. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 220. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 106. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 120. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 106. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 120.

Case 299. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 80. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 80. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 80. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 160. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$

and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 162. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 162. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 160. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 160. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 54. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 54. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 78. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 69.

Case 300. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 4. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 2 and 4 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 3, 4\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 2 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 2 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 4\}$, but then Fixer wins by Case 138.

Case 301. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{1, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 4. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 2 and 4 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 3, 4\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{1, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 2 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{1, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 2 and 4 at v_4. This results in a position with lists

$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{1,4\}$, but then Fixer wins by Case 139.

Case 302. *$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,1\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 4. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 2 and 4 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,3,4\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 2 and 4 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 2 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,4\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 149.

Case 303. *$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_2 and v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 80. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_3 and v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 50. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_4 and v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 52. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 54. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 54. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 54. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 162. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0,2\}$, $L(v_2) = \{0,1,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 160. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0,2\}$, $L(v_2) = \{0,1,3\}$, $L(v_3) = \{0,1,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 160. If the components of A_S have vertex

sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 162. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 162. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 69. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 78.

Case 304. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 3\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 4. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 2 and 4 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 3, 4\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 2 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 2 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 151.

Case 305. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 4. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 2 and 4 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 3, 4\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 2 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 2 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 152.

Case 306. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 4. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 2 and 4 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 3, 4\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 2 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 2 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 153.

Case 307. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{0, 4\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{0, 4\}$, but then Fixer wins by Case 80. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{0, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{0, 4\}$, but then Fixer can edge-color the graph.

Case 308. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{2, 4\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph.

Case 309. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_0. This results

in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 184. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 187. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 187. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 184. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 184. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 55. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 55. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph.

Case 310. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 4\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have

vertex sets $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 4\}$, but then Fixer can edge-color the graph.

Case 311. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ *and* $L(v_5) = \{2, 4\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 84. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 84. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 84. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 55. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 55. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 55. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 187. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 184. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 184. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 187. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 187. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 4\}$ and

$L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph.

Case 312. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 60. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_3\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 169.

Case 313. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{1, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 171. If the components of A_S have vertex sets $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 56. If the components of A_S have vertex sets $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 61.

Case 314. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 57. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_4\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 3 at v_4. This results in a position with lists

$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,3\}$, but then Fixer wins by Case 163.

Case 315. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{1,2\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,2\}$, but then Fixer wins by Case 58. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_4\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 3 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 164.

Case 316. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{0,1\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,2\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 174. If the components of A_S have vertex sets $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 59. If the components of A_S have vertex sets $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,2\}$ and $L(v_5) = \{0,3\}$, but then Fixer wins by Case 64.

Case 317. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{0,2\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 65. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_3\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 3 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 173.

Case 318. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,2,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,2\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 4. If the components of A_S have vertex sets $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 4 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0,4\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{1,2\}$ and $L(v_5) = \{1,2\}$, but then Fixer wins by Case 187. If the components of A_S have vertex

sets $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 4 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 4\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 108. If the components of A_S have vertex sets $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 4 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 4\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 121.

Case 319. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 2\}$ *and* $L(v_5) = \{0, 3\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 172. If the components of A_S have vertex sets $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 66.

Case 320. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 3\}$ *and* $L(v_5) = \{1, 2\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 161. If the components of A_S have vertex sets $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 63. If the components of A_S have vertex sets $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph.

Case 321. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 4\}$ *and* $L(v_5) = \{2, 4\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_3\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{3, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 191.

Case 322. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 4\}$ *and* $L(v_5) = \{1, 4\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_4\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{3, 4\}$, but then Fixer wins by Case 188.

Case 323. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 1\}$ *and* $L(v_5) = \{0, 2\}$.

Let S and A_S be as in Lemma 4 using colors 0 and 4. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 104. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 104. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 216. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_2. This results

in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0,v_2\}$ and $\{v_1,v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{1,4\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 216. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0,v_2\}$ and $\{v_1,v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{2,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0,v_4\}$ and $\{v_1,v_2\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{1,4\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 216. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0,v_3\}$ and $\{v_1,v_2\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{2,4\}$, but then Fixer can edge-color the graph.

Case 324. *$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{1,2\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1,v_2\}$ and $\{v_3,v_4\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{1,2\}$, but then Fixer wins by Case 99. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1,v_3\}$ and $\{v_2,v_4\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{1,2\}$, but then Fixer wins by Case 99. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1,v_4\}$ and $\{v_2,v_3\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{1,2\}$, but then Fixer wins by Case 99. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0,v_2\}$ and $\{v_3,v_4\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{1,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0,v_3\}$ and $\{v_2,v_4\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{1,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0,v_4\}$ and $\{v_2,v_3\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{1,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0,v_1\}$ and $\{v_3,v_4\}$, then Fixer should swap 1 and 3 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{1,2\}$, but then Fixer wins by Case 228. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0,v_1\}$ and $\{v_2,v_4\}$, then Fixer should swap 1 and 3 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{1,2\}$, but then Fixer wins by Case 228. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0,v_1\}$ and $\{v_2,v_3\}$, then Fixer should swap 1 and 3 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 194. If the components of A_S have vertex

sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_4 and v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 56. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 97. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_4 and v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 56. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 194. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 3 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 97. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 194.

Case 325. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 4. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 119. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 119. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 4\}$

and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 196. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 196. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 196.

Case 326. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 4. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 220. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 106. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 120. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 220. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 106. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 2\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 120. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a

position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0,v_1\}$ and $\{v_2,v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 218. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0,v_1\}$ and $\{v_2,v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{2,4\}$, but then Fixer wins by Case 197. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0,v_3\}$ and $\{v_1,v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0,v_4\}$ and $\{v_1,v_3\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{0,1,2\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0,v_2\}$ and $\{v_1,v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 218. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0,v_2\}$ and $\{v_1,v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{2,4\}$, but then Fixer wins by Case 197. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0,v_4\}$ and $\{v_1,v_2\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 218. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0,v_3\}$ and $\{v_1,v_2\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{2,4\}$, but then Fixer wins by Case 197.

Case 327. *$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,2\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 4. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_3,v_4\}$, then Fixer should swap 2 and 4 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,3,4\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1,v_4\}$, then Fixer should swap 2 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,4\}$ and $L(v_5) = \{1,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_1,v_3\}$, then Fixer should swap 2 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,4\}$, but then Fixer wins by Case 196.

Case 328. *$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,3\}$.*

Let S and A_S be as in Lemma 4 using colors 3 and 4. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2,v_4\}$, then Fixer should swap 3 and 4 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,4\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$

and $\{v_1, v_4\}$, then Fixer should swap 3 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 3\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 3 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 196.

Case 329. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 2\}$ *and* $L(v_5) = \{0, 1\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 101. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 101. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 101. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 232. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 205. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 3 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 232. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 93. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_3 and v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 64. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 3\}$ and

$L(v_5) = \{0, 1\}$, but then Fixer wins by Case 205. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_3 and v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 64. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 205. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 3 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 93.

Case 330. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 4. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 2 and 4 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 3, 4\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 2 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 216. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 2 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 4\}$, but then Fixer can edge-color the graph.

Case 331. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 3 and 4. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 3 and 4 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 4\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 3 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 3\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 3 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 216.

Case 332. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{2, 4\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 99. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 3 at v_2. This results in a position with lists

$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,4\}$ and $L(v_5) = \{2,4\}$, but then Fixer can edge-color the graph.

Case 333. *$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,4\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,4\}$, but then Fixer wins by Case 101. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,2\}$, $L(v_3) = \{1,2,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 3 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,4\}$, but then Fixer can edge-color the graph.

Case 334. *$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,3\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0,2\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,3\}$, but then Fixer wins by Case 56. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0,2\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,3\}$, but then Fixer wins by Case 56. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0,2\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,3\}$, but then Fixer wins by Case 56. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,3\}$, but then Fixer wins by Case 97. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,3\}$, but then Fixer wins by Case 97. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,3\}$, but then Fixer wins by Case 97. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0,2\}$, $L(v_2) = \{0,1,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,3\}$, but then Fixer wins by Case 194. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0,2\}$, $L(v_2) = \{0,1,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,3\}$, but then Fixer wins by Case 194. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2,3\}$, $L(v_3) = \{2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 228. If the components of A_S have vertex sets

$\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_4 and v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 99. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_4 and v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 99. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 228. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 228.

Case 335. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 64. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 64. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 64. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 93. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 93. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 93. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 205. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and

$L(v_5) = \{0, 3\}$, but then Fixer wins by Case 232. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 3 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 205. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_3 and v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 101. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 232. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 3 at v_3 and v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 101. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 232. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 3 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can edge-color the graph.

Case 336. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{4, 5\}$ and $L(v_5) = \{4, 5\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{4, 5\}$ and $L(v_5) = \{4, 5\}$, but then Fixer wins by Case 241. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{4, 5\}$ and $L(v_5) = \{4, 5\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{4, 5\}$ and $L(v_5) = \{4, 5\}$, but then Fixer wins by Case 258.

Case 337. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{1, 3\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 3 at v_0. This results in a position with lists $L(v_1) = \{1, 3\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 329. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_4\}$, then Fixer should swap 0 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{1, 2, 3\}$, $L(v_3) = \{0, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 330. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_0, v_1\}$, then Fixer should

swap 0 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 78.

Case 338. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 3\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 3 at v_0. This results in a position with lists $L(v_1) = \{1, 3\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 324. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_3\}$, then Fixer should swap 0 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{1, 2, 3\}$, $L(v_3) = \{0, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 327. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_0, v_1\}$, then Fixer should swap 0 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 2\}$, $L(v_3) = \{0, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 69.

Case 339. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 2 at v_0. This results in a position with lists $L(v_1) = \{1, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 325. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_4\}$, then Fixer should swap 0 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 327. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_0, v_2\}$, then Fixer should swap 0 and 2 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 302.

Case 340. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 2 at v_0. This results in a position with lists $L(v_1) = \{1, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 323. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_3\}$, then Fixer should swap 0 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 330. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_0, v_2\}$, then Fixer should swap 0 and 2 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 300.

Case 341. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{1, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 2. If the components of A_S have vertex sets $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{1, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 299. If the components of A_S have vertex sets $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 2 at v_3 and v_0. This results in a position with lists $L(v_1) = \{1, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 329. If the components of A_S have vertex

sets $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 2 at v_4 and v_0. This results in a position with lists $L(v_1) = \{1, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 324.

Case 342. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ *and* $L(v_5) = \{2, 4\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 321. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 311. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 309. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 321. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 321. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 311. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and

$L(v_5) = \{1, 4\}$, but then Fixer wins by Case 309. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 311. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 309.

Case 343. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 322. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 309. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 311. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 322. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 2, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 322. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_3. This results in a

position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 309. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 311. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 309. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 311.

Case 344. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{1, 4\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 2 at v_0. This results in a position with lists $L(v_1) = \{1, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_3\}$, then Fixer should swap 0 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{0, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_0, v_2\}$, then Fixer should swap 0 and 2 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 343.

Case 345. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 4\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 2 at v_0. This results in a position with lists $L(v_1) = \{1, 2\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_4\}$, then Fixer should swap 0 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{1, 2, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_0, v_2\}$, then Fixer should swap 0 and 2 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2, 3\}$, $L(v_3) = \{0, 1, 4\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 342.

□

Lemma 2. *Fixer has a winning strategy against Breaker in the chronicled game on the chair, with superabundant list assignment L where $|L(v_1)| = 2$, $|L(v_2)| = 2$, $|L(v_3)| = 4$, $|L(v_4)| = 2$ and $|L(v_5)| = 2$.*

Proof. We show that for each possible such list assignment L on G, Fixer has a winning strategy. Up to symmetry, the following cases cover all the possible list assignments that are not an immediate win for Fixer.

Case 1. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 2. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 3. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 4. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 5. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 0 and applying Lemma 3.

Case 6. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 0 and applying Lemma 3.

Case 7. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 8. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 9. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 2 and applying Lemma 3.

Case 10. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 2 and applying Lemma 3.

Case 11. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 2 and applying Lemma 3.

Case 12. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 13. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 14. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 15. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 16. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 17. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 2 and applying Lemma 3.

Case 18. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 0 and applying Lemma 3.

Case 19. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 2 and applying Lemma 3.

Case 20. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 1 and applying Lemma 3.

Case 21. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 2 and applying Lemma 3.

Case 22. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 23. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 24. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 25. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 26. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 0 and applying Lemma 3.

Case 27. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 28. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 1 and applying Lemma 3.

Case 29. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 30. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 31. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 32. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 33. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 34. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 35. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 36. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 37. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 38. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 39. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 40. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 41. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 42. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 43. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 44. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 45. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 46. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 47. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 48. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 49. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 50. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 51. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 52. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 53. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 54. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 55. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 56. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 57. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 58. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 59. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 60. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 61. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 62. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 63. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 64. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 65. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 66. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 67. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 68. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 69. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 70. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 71. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 72. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 73. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 74. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 75. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 76. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 77. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 78. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 79. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 80. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 81. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 82. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 83. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 84. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 85. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 86. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 87. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 88. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 89. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 90. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 91. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 92. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 93. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 94. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 95. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 96. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 97. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 98. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 99. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 100. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 101. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 102. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 103. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 104. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{2,5\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 2 and applying Lemma 3.

Case 105. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{2,5\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 106. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{2,5\}$ *and* $L(v_5) = \{2,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 1 and applying Lemma 3.

Case 107. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,4\}$ *and* $L(v_5) = \{3,5\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 2 and applying Lemma 3.

Case 108. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{2,5\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 109. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{3,5\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 110. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{3,5\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 111. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{3,5\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 112. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{4,5\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 113. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{4,5\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 114. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{4,5\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 115. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,4\}$ *and* $L(v_5) = \{3,5\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 4 and applying Lemma 3.

Case 116. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,5\}$ *and* $L(v_5) = \{0,1\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 117. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,5\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 118. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,5\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 119. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,5\}$ *and* $L(v_5) = \{0,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 120. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,5\}$ *and* $L(v_5) = \{1,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 121. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,5\}$ *and* $L(v_5) = \{2,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 122. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,5\}$ *and* $L(v_5) = \{3,4\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 123. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,5\}$ *and* $L(v_5) = \{4,5\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 124. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{3,5\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 125. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,5\}$ *and* $L(v_5) = \{0,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 126. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{3,5\}$ *and* $L(v_5) = \{1,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 127. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{3,5\}$ *and* $L(v_5) = \{3,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 128. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{3,5\}$.

Fixer gets a winning strategy by coloring v_5v_3 with 3 and applying Lemma 3.

Case 129. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{1,5\}$ *and* $L(v_5) = \{1,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 130. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{3,5\}$ *and* $L(v_5) = \{0,2\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 131. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{3,5\}$ *and* $L(v_5) = \{3,5\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 132. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{2,3,4,5\}$, $L(v_4) = \{0,3\}$ *and* $L(v_5) = \{0,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 133. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{2,3,4,5\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{1,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 134. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{2,3,4,5\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 135. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,5\}$ *and* $L(v_5) = \{4,6\}$.

Fixer gets a winning strategy by coloring v_4v_3 with 3 and applying Lemma 3.

Case 136. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{2,3,4,5\}$, $L(v_4) = \{3,6\}$ *and* $L(v_5) = \{3,6\}$.

Fixer gets a winning strategy by coloring v_1v_2 with 0 and applying Lemma 3.

Case 137. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,4\}$ *and* $L(v_5) = \{1,4\}$.

Let S and A_S be as in Lemma 4 using colors 2 and 4. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 2 and 4 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,4\}$ and $L(v_5) = \{1,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 2 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 2 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,4\}$ and $L(v_5) = \{1,2\}$, but then Fixer can edge-color the graph.

Case 138. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,1\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 13. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 5. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 6. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 80. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists

$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 80. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 80. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 12. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 9. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 12. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 9. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 12. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 9.

Case 139. *$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,4\}$ and $L(v_5) = \{2,4\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 4. If the components of A_S have vertex sets $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 4 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0,4\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,4\}$ and $L(v_5) = \{2,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 4 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0,4\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{2,4\}$, but then Fixer wins by Case 86. If the components of A_S have vertex sets $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 4 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0,4\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,4\}$ and $L(v_5) = \{1,2\}$, but then Fixer can edge-color the graph.

Case 140. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{1,4\}$ *and* $L(v_5) = \{2,4\}$.

Let S and A_S be as in Lemma 4 using colors 0 and 4. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{1,4\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 100. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{2,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{1,4\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 100. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{2,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{1,4\}$ and $L(v_5) = \{2,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{2,4\}$, but then Fixer wins by Case 17. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{1,4\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{1,4\}$ and $L(v_5) = \{2,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{1,4\}$ and $L(v_5) = \{2,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{2,4\}$, but then Fixer wins by Case 17. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{1,4\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,1\}$

and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 17. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{1, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph.

Case 141. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 4\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 4. If the components of A_S have vertex sets $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 4 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 4\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 4 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 4\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 4 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 4\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 82.

Case 142. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 4. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 94. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 4\}$, but then Fixer wins by Case 94. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results

in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 30. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{1,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{1,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 30. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{1,4\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 30.

Case 143. *$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{2,4\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 4. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 101. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{2,4\}$, but then Fixer wins by Case 95. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 101. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{2,4\}$, but then Fixer wins by Case 95. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{2,4\}$ and $L(v_5) = \{2,4\}$, but then Fixer wins by Case 102. If the components of A_S have vertex

sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 19. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 31. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 102. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 102. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 19. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 31. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 4 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 4\}$, but then Fixer wins by Case 19. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{2, 4\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 31.

Case 144. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 13. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 13. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 13. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$

and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 80. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 81. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 81. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 80. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 80. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 7. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 7. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 12. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 9.

Case 145. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 3. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 2 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 3\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 2 and 3 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 2 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 40.

Case 146. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{1, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 3. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 2 and 3 at v_1. This results in a position with

lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,3\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{1,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 2 and 3 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{1,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 2 and 3 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{1,3\}$, but then Fixer wins by Case 41.

Case 147. *$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,1\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 3. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 2 and 3 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,3\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 2 and 3 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 2 and 3 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,3\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 52.

Case 148. *$L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_2 and v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 13. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_3 and v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,1\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 5. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_4 and v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,1\}$, but then Fixer wins by Case 6. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 7. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 7. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 7. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 81. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and

$\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 80. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 80. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 81. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 81. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 9. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 12.

Case 149. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 3. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 2 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 3\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 2 and 3 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 2 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 59.

Case 150. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{0, 3\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 13. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can

edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can edge-color the graph.

Case 151. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{2, 3\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph.

Case 152. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{1, 3\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 88. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 90. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results

in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 90. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 88. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 88. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 8. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 8. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph.

Case 153. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{2, 3\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 4. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 2 and 4 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 4\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 2 and 4 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 3\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 2 and 4 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{3, 4\}$, but then Fixer wins by Case 65.

Case 154. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 3\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can edge-color the graph.

Case 155. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{1,3\}$.

Let S and A_S be as in Lemma 4 using colors 2 and 4. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 2 and 4 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,4\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{1,3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 2 and 4 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{1,3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 2 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{3,4\}$ and $L(v_5) = \{1,3\}$, but then Fixer wins by Case 77.

Case 156. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{2,3\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0,2\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 15. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0,2\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 15. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0,2\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 15. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 8. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 8. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 8. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 90. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0,2\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 88. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 2 at v_1 and v_0. This results in a position with lists $L(v_1) = \{0,2\}$, $L(v_2) = \{0,1\}$, $L(v_3) = \{0,1,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 88. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{2,3\}$,

but then Fixer wins by Case 90. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 90. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 1 and 2 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph.

Case 157. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 26. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_3\}$, then Fixer should swap 1 and 3 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph.

Case 158. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{1, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{1, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 3 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 17. If the components of A_S have vertex sets $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 3 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph.

Case 159. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with

lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 18. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_4\}$, then Fixer should swap 1 and 3 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can edge-color the graph.

Case 160. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 19. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_4\}$, then Fixer should swap 1 and 3 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph.

Case 161. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 3 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 3 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 30.

Case 162. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 3 at v_0. This results in a position with lists $L(v_1) = \{0, 3\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 31. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_3\}$, then Fixer should swap 1 and 3 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph.

Case 163. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{1,2\}$ *and* $L(v_5) = \{1,2\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 3. If the components of A_S have vertex sets $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 1 and 3 at v_2 and v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,4\}$, $L(v_4) = \{1,2\}$ and $L(v_5) = \{1,2\}$, but then Fixer wins by Case 90. If the components of A_S have vertex sets $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 3 at v_3 and v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{1,2\}$, but then Fixer wins by Case 21. If the components of A_S have vertex sets $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 3 at v_4 and v_0. This results in a position with lists $L(v_1) = \{0,3\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{1,2\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 32.

Case 164. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{1,3\}$ *and* $L(v_5) = \{2,3\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 4. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_2, v_3\}$, then Fixer should swap 1 and 4 at v_0. This results in a position with lists $L(v_1) = \{0,4\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{1,3\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 37. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_3\}$, then Fixer should swap 1 and 4 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{1,3\}$ and $L(v_5) = \{2,3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 4 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{3,4\}$ and $L(v_5) = \{2,3\}$, but then Fixer can edge-color the graph.

Case 165. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{2,3\}$ *and* $L(v_5) = \{1,3\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 4. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_2, v_4\}$, then Fixer should swap 1 and 4 at v_0. This results in a position with lists $L(v_1) = \{0,4\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{1,3\}$, but then Fixer wins by Case 25. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_4\}$, then Fixer should swap 1 and 4 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,3\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{1,3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 4 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,2,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{3,4\}$, but then Fixer can edge-color the graph.

Case 166. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,1\}$ *and* $L(v_5) = \{0,2\}$.

Let S and A_S be as in Lemma 4 using colors 0 and 3. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 3 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{1,3\}$ and $L(v_5) = \{2,3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 3 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,4\}$, $L(v_4) = \{0,1\}$

and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 17. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 3 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 3 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 3 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 17. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 3 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 3 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 100. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 3 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 3 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 100. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 100. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph.

Case 167. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 3. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 3 at v_4 and v_3. This results in

a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 3 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 3 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 30. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 3 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 3 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 3 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 30. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 3 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 94. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 3 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 3 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 2, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 94. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 1\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 94.

Case 168. $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,2\}$ *and* $L(v_5) = \{0,2\}$.

Let S and A_S be as in Lemma 4 using colors 0 and 3. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 3 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 102. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 3 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 19. If the components of A_S have vertex sets $\{v_0\}$, $\{v_1, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 3 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 31. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_2\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 3 at v_4 and v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 102. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_3\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 3 at v_4 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 19. If the components of A_S have vertex sets $\{v_1\}$, $\{v_0, v_4\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 3 at v_3 and v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 31. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 0 and 3 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 3 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 101. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 3 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 95. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 3 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$, $\{v_0, v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 3 at v_2. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{0,1,2,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{0,2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 3 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{2,3\}$ and $L(v_5) = \{0,2\}$, but then Fixer wins by Case 101. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 3 at v_4. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{0,2\}$ and $L(v_5) = \{2,3\}$, but then Fixer wins by Case 95. If the components of A_S have vertex sets $\{v_3\}$, $\{v_0, v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 3 at v_3. This results in a position with lists $L(v_1) = \{0,1\}$, $L(v_2) = \{0,2\}$, $L(v_3) = \{1,2,3,4\}$, $L(v_4) = \{2,3\}$ and

$L(v_5) = \{0, 2\}$, but then Fixer wins by Case 101. If the components of A_S have vertex sets $\{v_4\}$, $\{v_0, v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 95.

Case 169. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 3. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 2 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 3\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 2 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{1, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 2 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 94.

Case 170. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 2 and 3. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_3, v_4\}$, then Fixer should swap 2 and 3 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 3\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1, v_4\}$, then Fixer should swap 2 and 3 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 100. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_1, v_3\}$, then Fixer should swap 2 and 3 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can edge-color the graph.

Case 171. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{3, 5\}$ and $L(v_5) = \{3, 5\}$.*

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{3, 5\}$ and $L(v_5) = \{3, 5\}$, but then Fixer wins by Case 106. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{3, 5\}$ and $L(v_5) = \{3, 5\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{3, 5\}$ and $L(v_5) = \{3, 5\}$, but then Fixer wins by Case 127.

Case 172. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 2 at v_0. This results in a position with lists $L(v_1) = \{1, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 2\}$,

but then Fixer wins by Case 167. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_4\}$, then Fixer should swap 0 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 169. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_0, v_2\}$, then Fixer should swap 0 and 2 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 147.

Case 173. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 2\}$ *and* $L(v_5) = \{0, 2\}$.

Let S and A_S be as in Lemma 4 using colors 0 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 2 at v_0. This results in a position with lists $L(v_1) = \{1, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 166. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_3\}$, then Fixer should swap 0 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 170. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_0, v_2\}$, then Fixer should swap 0 and 2 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 145.

Case 174. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 2\}$ *and* $L(v_5) = \{1, 2\}$.

Let S and A_S be as in Lemma 4 using colors 1 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_2\}$, then Fixer should swap 1 and 2 at v_0. This results in a position with lists $L(v_1) = \{0, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 15. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_2\}$, then Fixer should swap 1 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 7. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_1\}$, then Fixer should swap 1 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 163.

Case 175. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 3\}$ *and* $L(v_5) = \{1, 3\}$.

Let S and A_S be as in Lemma 4 using colors 0 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 2 at v_0. This results in a position with lists $L(v_1) = \{1, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_3\}$, then Fixer should swap 0 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_0, v_2\}$, then Fixer should swap 0 and 2 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer wins by Case 155.

Case 176. $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ *and* $L(v_5) = \{0, 3\}$.

Let S and A_S be as in Lemma 4 using colors 0 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 2 at v_0. This results in a position with

lists $L(v_1) = \{1, 2\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_0, v_4\}$, then Fixer should swap 0 and 2 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_0, v_2\}$, then Fixer should swap 0 and 2 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 1, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 153.

Case 177. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{1, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 1. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 1 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{1, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 157. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 1 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 158. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 1 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 166.

Case 178. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 1. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 1 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{1, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 159. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 1 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 161. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 1 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 167.

Case 179. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{2, 3\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 1. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_3\}$, then Fixer should swap 0 and 1 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{1, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer wins by Case 164. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 1 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 1 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{1, 3\}$ and $L(v_5) = \{2, 3\}$, but then Fixer can edge-color the graph.

Case 180. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 3\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 1. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_2, v_4\}$, then Fixer should swap 0 and 1 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{1, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer wins by Case 165. If the components of A_S have vertex sets $\{v_2\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 1 at v_2. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{0, 3\}$, but then Fixer can edge-color the graph. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_1, v_2\}$, then Fixer should swap 0 and 1 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 2\}$, $L(v_3) = \{1, 2, 3, 4\}$, $L(v_4) = \{2, 3\}$ and $L(v_5) = \{1, 3\}$, but then Fixer can edge-color the graph.

Case 181. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_4\}$, then Fixer should swap 0 and 2 at v_0. This results in a position with lists $L(v_1) = \{1, 2\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 178. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_4\}$, then Fixer should swap 0 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{1, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{1, 2\}$, but then Fixer wins by Case 170. If the components of A_S have vertex sets $\{v_4\}$ and $\{v_0, v_1\}$, then Fixer should swap 0 and 2 at v_4. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 2\}$ and $L(v_5) = \{0, 1\}$, but then Fixer wins by Case 12.

Case 182. *$L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$.*

Let S and A_S be as in Lemma 4 using colors 0 and 2. If the components of A_S have vertex sets $\{v_0\}$ and $\{v_1, v_3\}$, then Fixer should swap 0 and 2 at v_0. This results in a position with lists $L(v_1) = \{1, 2\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 177. If the components of A_S have vertex sets $\{v_1\}$ and $\{v_0, v_3\}$, then Fixer should swap 0 and 2 at v_1. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{1, 2\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{1, 2\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 169. If the components of A_S have vertex sets $\{v_3\}$ and $\{v_0, v_1\}$, then Fixer should swap 0 and 2 at v_3. This results in a position with lists $L(v_1) = \{0, 1\}$, $L(v_2) = \{0, 1\}$, $L(v_3) = \{0, 2, 3, 4\}$, $L(v_4) = \{0, 1\}$ and $L(v_5) = \{0, 2\}$, but then Fixer wins by Case 9.

□

Lemma 3. *Let G be a multigraph and L a list assignment on G. Suppose we have an edge-coloring π of $H \subseteq G$ where $\pi(xy) \in L(x) \cap L(y)$ for all $xy \in E(H)$. Put $G' := G - E(H)$ and $L'(v) := L(v) - \pi(E_H(v))$ for all $v \in V(G')$. If Fixer has a winning strategy against Breaker in the chronicled game on G' with lists L', then Fixer has a winning strategy against Breaker in the chronicled game on G with lists L.*

Lemma 4. *Let G be a multigraph, L a list assignment on G and $\alpha, \beta \in \mathrm{Pot}(L)$. Let $S \subseteq V(G)$ be those vertices v with $|\{\alpha, \beta\} \cap L(v)| = 1$. Then there is a graph A_S with vertex set S and $\Delta(A_S) \leq 1$ such that Fixer has a sequence of moves against Breaker in the chronicled game resulting in a list assignment where Fixer has chosen to swap α and β all or none of the vertices in each component of A_S.*

Proof. For each $v \in S$, Fixer should swap α and β at v twice in a row. Now every $v \in S$ is incident to an edge in $\mathcal{C}$; that is, as long as Fixer only does swaps with α and β, Breaker's moves are already foretold in the chronicle. Now add an edge in A_S for each $xy \in \mathcal{C} - \infty$ labeled $\{\alpha, \beta\}$. The lemma follows. $\square$