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[ > restart; read `G:/My Drive/Aek/SubtractTransferGame/Lengyel.txt`;
[ > # Show some numerical results from the paper
[ >
[ > # Section 1: Lengyel Previous results
[ > # Thm1.3(a)
[ > A:=matrix(Lengyel(1,1,10,10));
      A:=
      [ 0 2 0 2 0 2 0 2 0 2
        1 3 1 3 1 3 1 3 1 3
        0 2 0 2 0 2 0 2 0 2
        1 3 1 3 1 3 1 3 1 3
        0 2 0 2 0 2 0 2 0 2
        1 3 1 3 1 3 1 3 1 3
        0 2 0 2 0 2 0 2 0 2
        1 3 1 3 1 3 1 3 1 3
        0 2 0 2 0 2 0 2 0 2
        1 3 1 3 1 3 1 3 1 3 ]
[ > Per(Lengyel(1,1,10,10));
      [0, 2, 2]
[ >
[ > # Thm1.3(b)
[ > [seq(Per(Lengyel(2*b,2*b,20+4*b,20+4*b)),b=1..5)];
      [[0, 4, 4], [0, 8, 8], [0, 12, 12], [0, 16, 16], [0, 20, 20]]
[ > # Check the P-positions
[ > A:=Matrix(Lengyel(6,6,10,10));
      A:=
      [ 0 1 0 1 0 1 1 0 1 0
        0 1 0 1 0 0 1 0 1 0
        0 1 0 1 1 0 1 0 1 0
        0 1 0 0 1 0 1 0 1 1
        0 1 1 0 1 0 1 0 0 1
        0 0 1 0 1 0 1 1 0 1
        1 0 1 0 1 0 0 1 0 1
        1 0 1 0 1 1 0 1 0 1
        1 0 1 0 0 1 0 1 0 1
        1 0 1 1 0 1 0 1 0 0 ]
[ > B:=Matrix([seq([seq( (floor((x+y)/6)+x) mod 2,x=0..9)],y=0..9)]);
      B:=
      [ 0 1 0 1 0 1 1 0 1 0
        0 1 0 1 0 0 1 0 1 0
        0 1 0 1 1 0 1 0 1 0
        0 1 0 0 1 0 1 0 1 1
        0 1 1 0 1 0 1 0 0 1
        0 0 1 0 1 0 1 1 0 1
        1 0 1 0 1 0 0 1 0 1
        1 0 1 0 1 1 0 1 0 1
        1 0 1 0 0 1 0 1 0 1
        1 0 1 1 0 1 0 1 0 0 ]
[ > A-B;

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[
      [0 1 0 1 0 2 1 0 1 0 1 2]
      [0 1 0 2 1 0 1 0 1 2 0 1]
      [0 2 1 0 1 0 1 2 0 1 0 1]
      [1 0 1 0 1 3 0 1 0 1 0 3]
      [1 0 1 3 0 1 0 1 0 3 1 0]
      [1 3 0 1 0 1 0 3 1 0 1 0]
]
>
> # Test Lemma 6.1 Vector elimination
> Lem61(3,1,5,2,1);
                                     true
> Per(Alon(3,1,5,2,1,20,20));
                                     [0, 3, 6]
> Per(TwoOptions(3,1,5,20,20));
                                     [0, 3, 6]
>
> # Figure 11 of Proposition 8.1
> matrix(Alon(1,7,0,6,1,52,2));
[0,0,0,0,0,0,0,2,2,2,2,2,2,1,0,0,0,0,0,1,0,2,2,2,2,1,0,1,0,0,0,1,0,1,0,2,2,1,0,1,0,
  1,0,1,0,1,0,1,0,1,0,1]
[1,1,1,1,1,1,1,3,3,3,3,3,3,0,1,1,1,1,1,0,1,3,3,3,3,0,1,0,1,1,1,0,1,0,1,3,3,0,1,0,1,
  0,1,0,1,0,1,0,1,0,1,0]
> matrix(Alon(1,7,0,8,1,60,2));
[0,0,0,0,0,0,0,1,2,2,2,2,2,2,0,1,0,0,0,0,0,1,0,1,2,2,2,2,0,1,0,1,0,0,0,1,0,1,0,1,2,
  2,0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,1]
[1,1,1,1,1,1,1,0,3,3,3,3,3,3,1,0,1,1,1,1,1,0,1,0,3,3,3,3,1,0,1,0,1,1,1,0,1,0,1,0,1,0,3,
  3,1,0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,1,0]
>
> # Proposition 9.2
> seq(Per(LengStar(b,b,b,20+2*b,4*b)),b=2..10);
      [0, 4, 4], [0, 5, 6], [0, 6, 8], [0, 7, 10], [0, 8, 12], [0, 9, 14], [0, 10, 16], [0, 11, 18], [0, 12, 20]
>
> # Figure13
> b:=6:
> matrix(LengStar(b,b,b,b+2,2*b));
      [0 1 2 3 4 5 6 7]
      [0 1 2 3 4 5 6 7]
      [0 1 2 3 4 5 6 7]
      [0 1 2 3 4 5 6 7]
      [0 1 2 3 4 5 6 7]
      [0 0 2 2 4 4 6 6]
      [1 0 3 2 5 4 7 6]
      [1 0 3 2 5 4 7 6]
      [1 0 3 2 5 4 7 6]
      [1 0 3 2 5 4 7 6]
      [1 0 3 2 5 4 7 6]
      [1 1 3 3 5 5 7 7]
> [seq(Per(LengStar(a,a,a,20,20)),a=1..5)];
      [[0, 2, 2], [0, 4, 4], [0, 5, 6], [0, 6, 8], [0, 7, 10]]
> [seq(Per(LengStar(1,3,c,60+2*c*(c+1),12)),c={1,3,5,7,9,11,13,15,17,19,21})];
[[0, 12, 6], [0, 12, 6], [0, 6, 6], [0, 24, 6], [120, "No Period p", 6], [0, 12, 6], [0, 168, 6], [0, 48, 6], [0, 18, 6], [0, 60, 6],
  [0, 330, 6]]
>
> # Section 10 Some examples of more general subtraction-transfer set
> S := {[0,-3],[-2,0],[-1,3],[-2,2],[-4,1]};

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[                                     S := {[ -4, 1], [-2, 0], [-2, 2], [-1, 3], [0, -3]}
[ > matrix(GeneralGame(S,29,6));
[
[   [0 0 2 1 1 3 3 1 4 0 0 2 1 3 0 0 2 1 1 2 0 3 1 4 0 0 3 1 2]
[   [0 0 2 2 1 1 3 0 4 1 1 2 0 0 2 1 3 0 2 1 1 2 0 3 1 1 2 0 0]
[   [0 0 2 2 0 0 2 1 1 3 0 2 1 4 0 0 2 1 3 0 0 2 1 1 2 0 3 1 2]
[   [1 1 3 0 0 2 2 0 5 1 1 3 0 2 1 1 3 0 0 3 1 2 0 5 1 1 2 0 3]
[   [1 1 3 3 0 0 2 1 5 0 0 3 1 1 3 0 2 1 3 0 0 3 1 2 0 0 3 1 1]
[   [1 1 3 3 1 1 3 0 0 2 1 3 0 5 1 1 3 0 2 1 1 3 0 0 3 1 2 0 3]
[ >
[ > # Figure15
[ > S := {[0,-2],[-1,0],[-3,-2],[-2,2]};
[                                     S := {[ -3, -2], [-2, 2], [-1, 0], [0, -2]}
[ > matrix(GeneralGame(S,10,10));
[
[   [0 1 0 1 0 1 0 1 0 1]
[   [0 1 0 1 0 1 0 1 0 1]
[   [1 0 1 2 3 2 3 2 3 2]
[   [1 0 1 2 3 2 3 2 3 2]
[   [0 1 0 3 2 0 1 0 1 0]
[   [0 1 0 3 2 0 1 0 1 0]
[   [1 0 1 2 3 1 0 1 2 3]
[   [1 0 1 2 3 1 0 1 2 3]
[   [0 1 0 3 2 0 1 0 3 2]
[   [0 1 0 3 2 0 1 0 3 2]
[ >
[ > # The last discussion before Question 6
[ > S := {[0,-3],[-2,0],[-1,3],[-2,2],[-3,1],[-1,-2]};
[                                     S := {[ -3, 1], [-2, 0], [-2, 2], [-1, -2], [-1, 3], [0, -3]}
[ > matrix(GeneralGame(S,29,6));
[
[   [0 0 2 1 1 3 3 1 1 2 0 0 2 2 1 1 3 0 1 2 0 0 1 2 0 1 2 0 1]
[   [0 0 2 2 0 3 1 1 3 3 4 0 0 2 2 0 1 1 3 0 4 2 0 1 2 0 0 1 2]
[   [0 2 2 0 0 2 2 1 3 3 1 1 2 0 0 2 2 1 1 3 0 1 1 2 0 1 2 0 1]
[   [1 1 3 0 0 2 2 0 0 4 1 1 3 3 0 0 2 2 0 4 1 3 0 1 2 0 1 2 0]
[   [1 1 3 3 1 2 0 0 2 2 5 5 3 1 1 3 0 0 2 2 5 1 2 0 1 1 2 0 1]
[   [1 3 3 1 1 3 3 0 2 2 0 0 5 2 1 1 3 0 0 1 2 0 0 1 2 0 1 2 0]
[ >

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