

The Game of 31 Strategy

```
> restart; printlevel:=4: interface(rtablesize=36):  
> win:=Matrix(36,6,(i,j)->NULL): win31:=Matrix(31,4,(i,j)->NULL):  
> for i from 30 to 1 by -1 do  
  for j from 1 to 6 do  
    for k from 1 to 6 do  
      if k=j or k=7-j then  
        next;  
      elif i+k>31 then  
        next;  
      elif win[i+k,k]=NULL then  
        win[i,j]:=[win[i,j][],k];  
      end if;  
    end do;  
  end do;  
end do:  
> for j from 1 to 3 do  
  win31[1,j+1]:=[j,7-j];  
end do:  
for i from 1 to 30 do  
  win31[i+1,1]:=31-i;  
  for j from 1 to 3 do  
    win31[i+1,j+1]:=win[31-i,j];  
  end do;  
end do:
```

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> win31;
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<i>NULL</i>	[1, 6]	[2, 5]	[3, 4]
30	<i>NULL</i>	[1]	[1]
29	[2]	[1]	[1, 2]
28	[3]	[3]	<i>NULL</i>
27	[4]	[4]	<i>NULL</i>
26	[5]	<i>NULL</i>	[5]
25	[3]	[3, 6]	[6]
24	[2, 3, 4]	[3, 4, 6]	[2, 6]
23	[4]	[4]	<i>NULL</i>
22	<i>NULL</i>	<i>NULL</i>	<i>NULL</i>
21	[5]	[1]	[1, 5]
20	[2, 3]	[3]	[2]
19	[3, 4]	[3, 4]	<i>NULL</i>
18	[4]	[4]	<i>NULL</i>
17	[5]	<i>NULL</i>	[5]
16	[3]	[3, 6]	[6]
15	[2, 3, 4]	[3, 4]	[2]
14	[4]	[4]	<i>NULL</i>
13	<i>NULL</i>	<i>NULL</i>	<i>NULL</i>
12	[5]	[1]	[1, 5]
11	[2, 3]	[3]	[2]
10	[3, 4]	[3, 4]	<i>NULL</i>
9	[4]	[4]	<i>NULL</i>
8	[5]	<i>NULL</i>	[5]
7	[3]	[3, 6]	[6]
6	[2, 3, 4]	[3, 4]	[2]
5	[4]	[4]	<i>NULL</i>
4	<i>NULL</i>	<i>NULL</i>	<i>NULL</i>
3	[5]	[1]	[1, 5]
2	[2, 3]	[3]	[2]
1	[3, 4]	[3, 4]	<i>NULL</i>

(1)