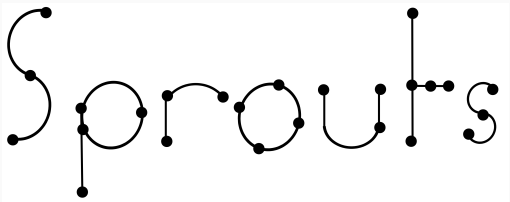


Towards an Impartial Short Tafl Variant

C. Tennenhouse

University of New England
Biddeford, Maine

- Motivation

- Motivation
- Background on Tafl

- Motivation
- Background on Tafl
- Some possible rulesets

- Motivation
- Background on Tafl
- Some possible rulesets
- What's next?

Motivation

It starts with a trip to the National Museum in Edinburgh

It starts with a trip to the National Museum in Edinburgh

It starts with a trip to the National Museum in Edinburgh

What game is this?

It starts with a trip to the National Museum in Edinburgh

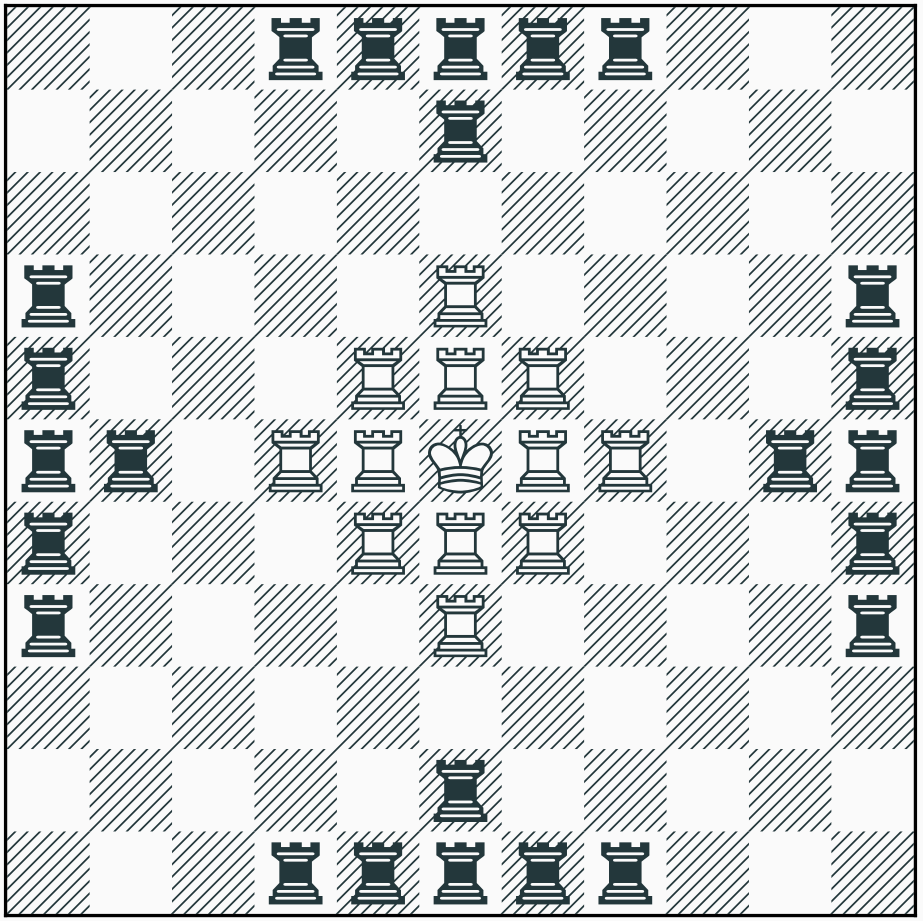
What game is this?

Probably Hnefatafl

Tafl games

What are Tafl games?

What are Tafl games?



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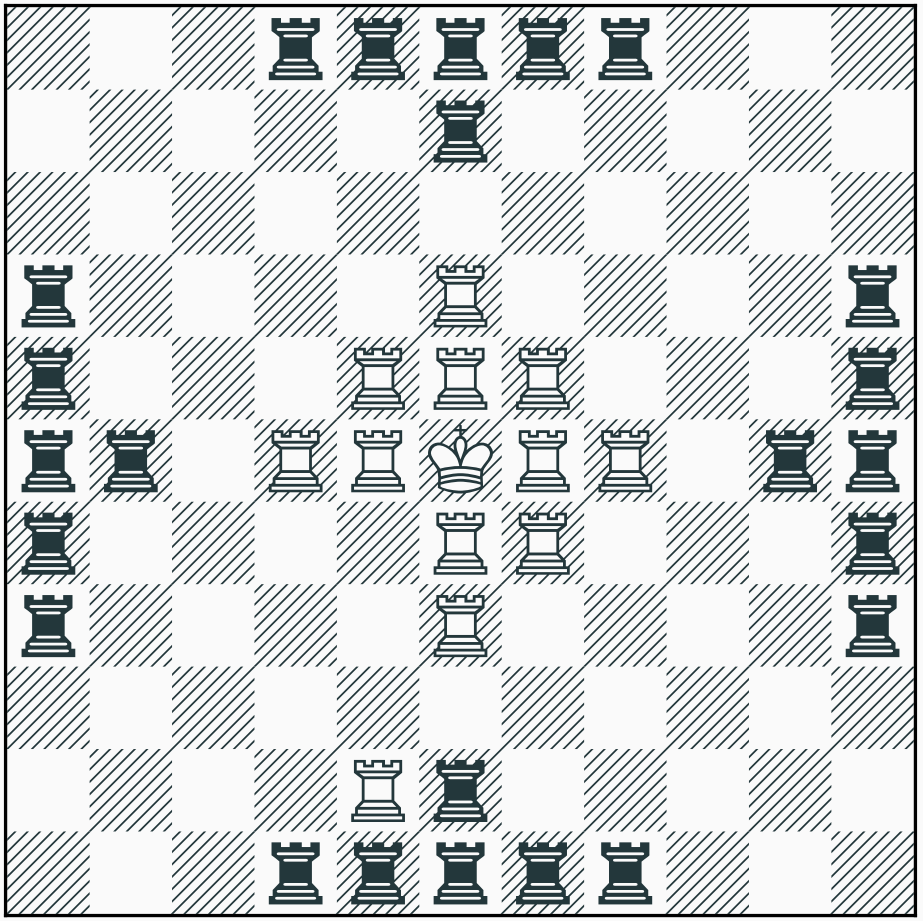

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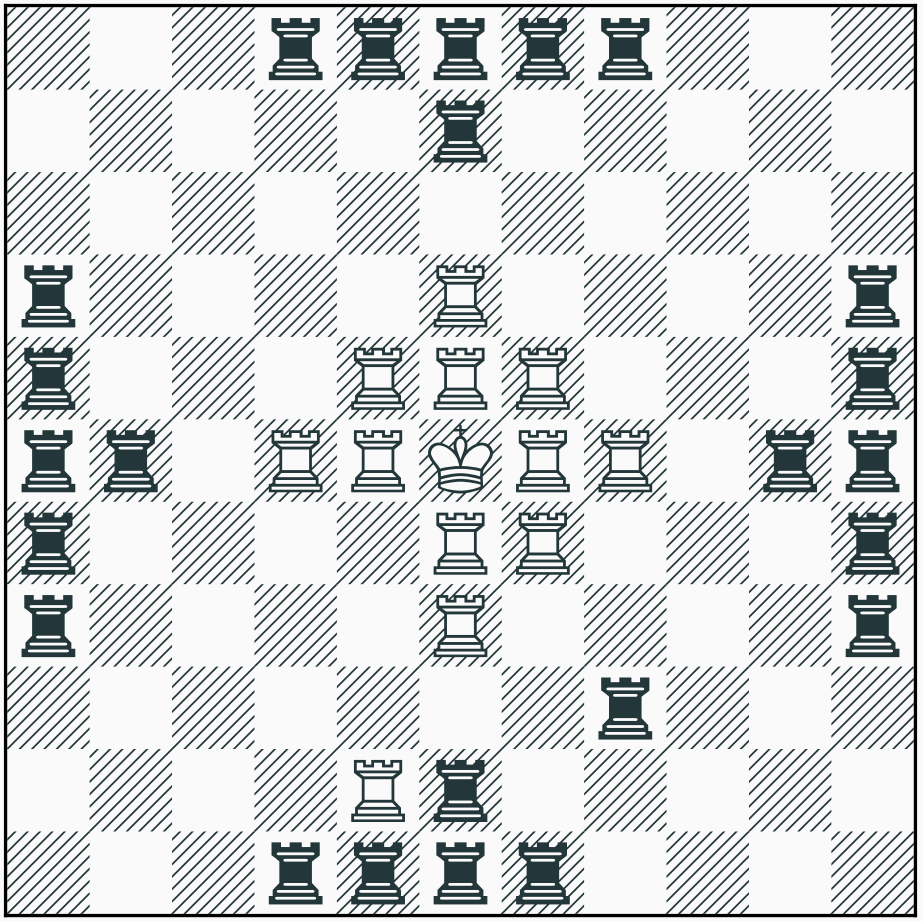

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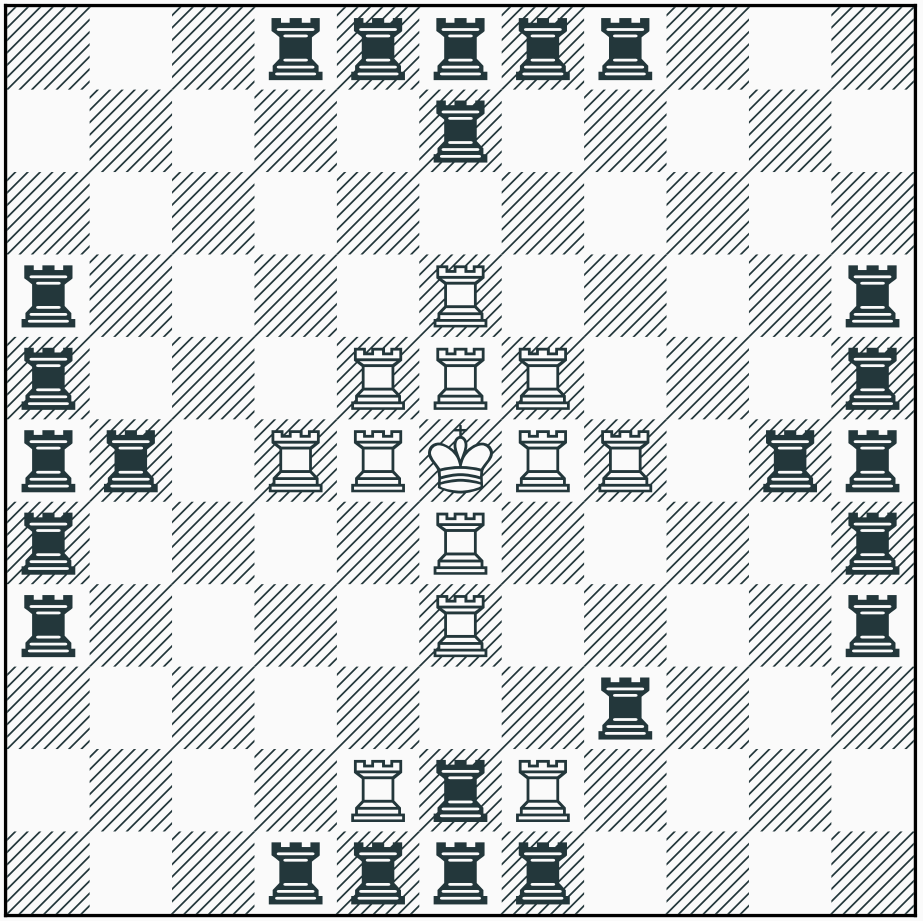

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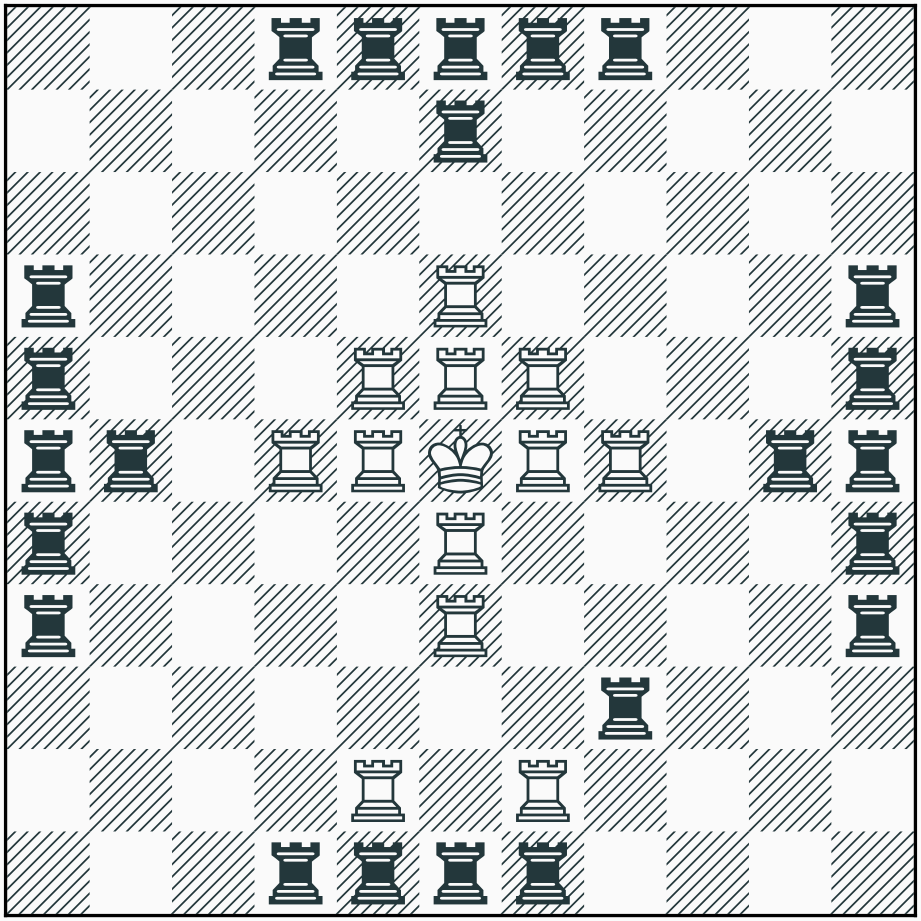

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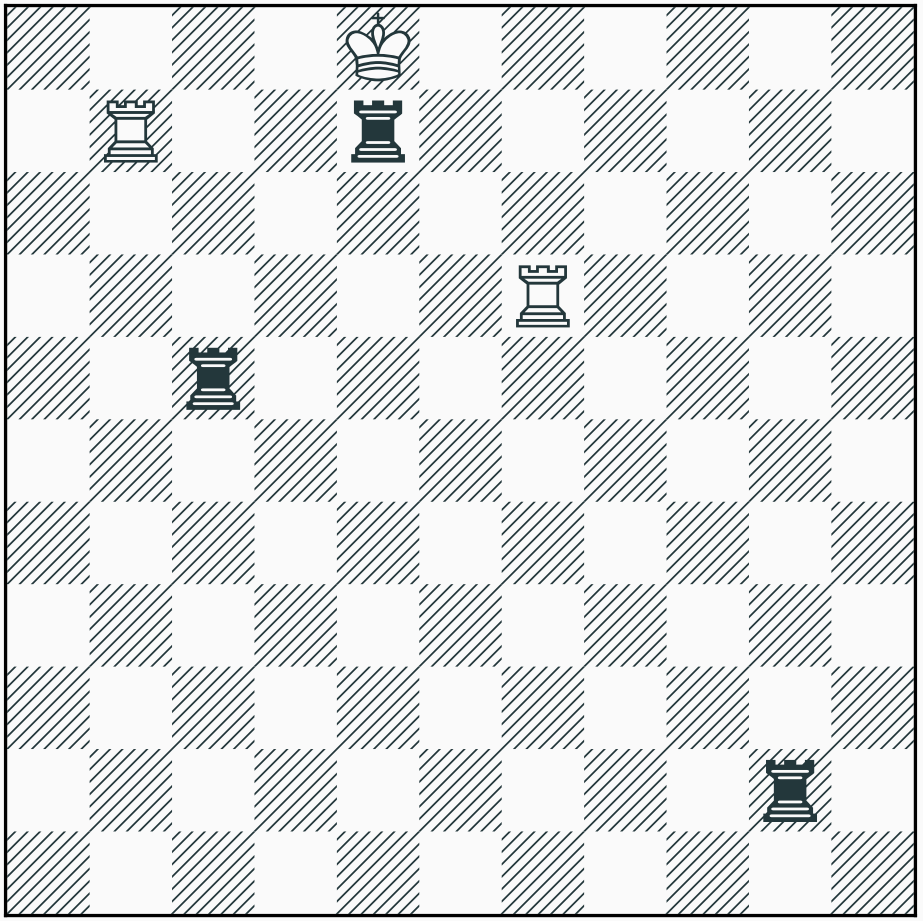

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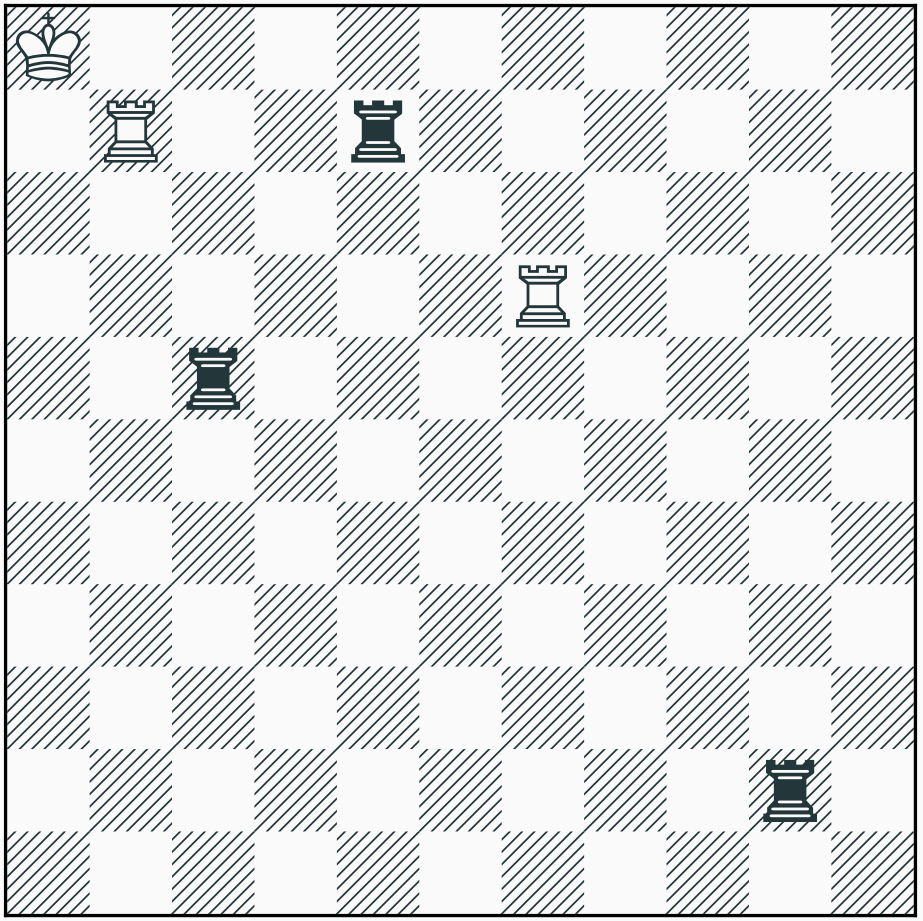

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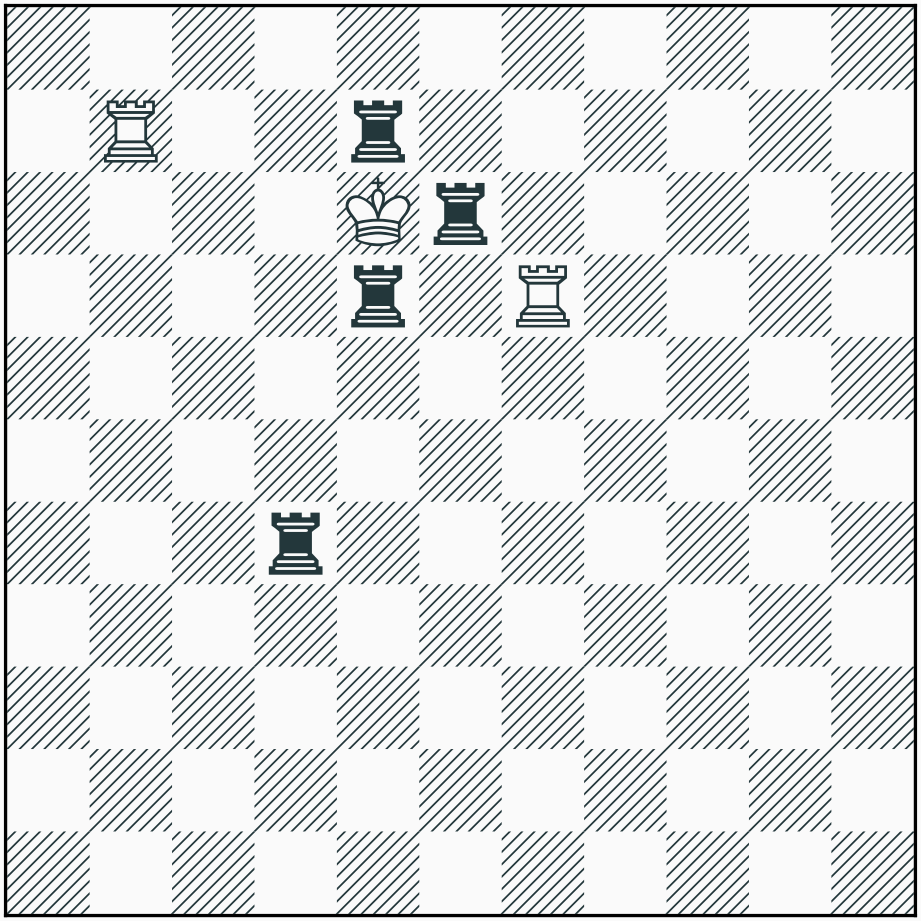

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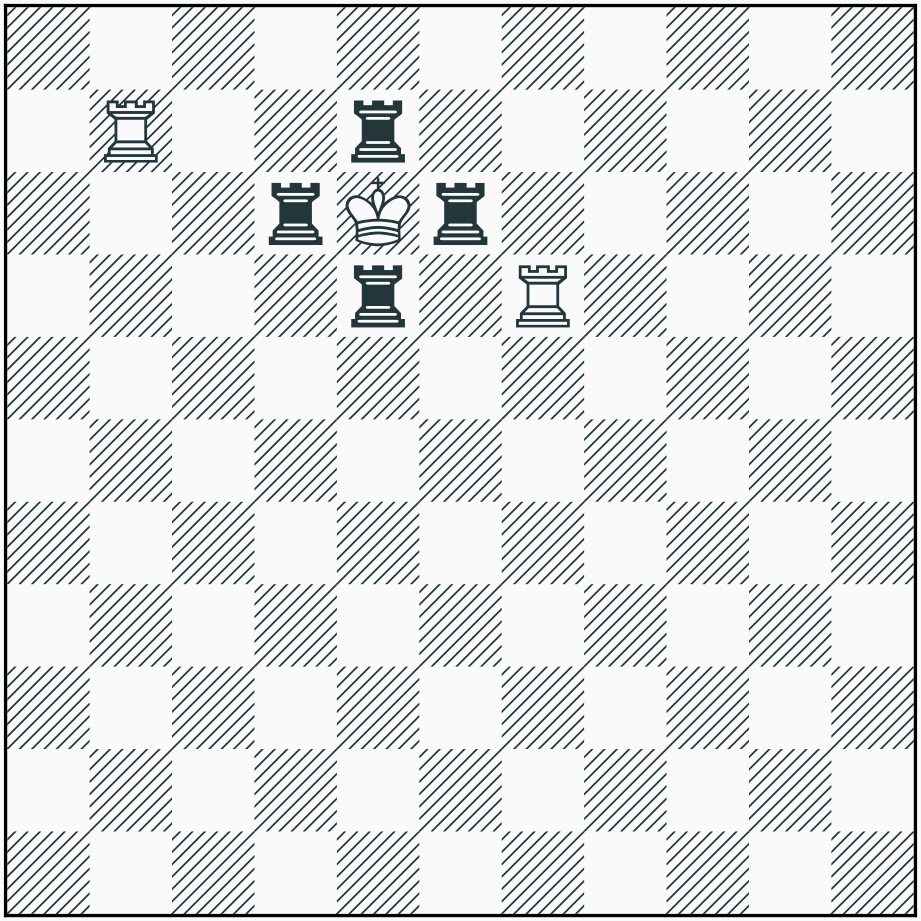
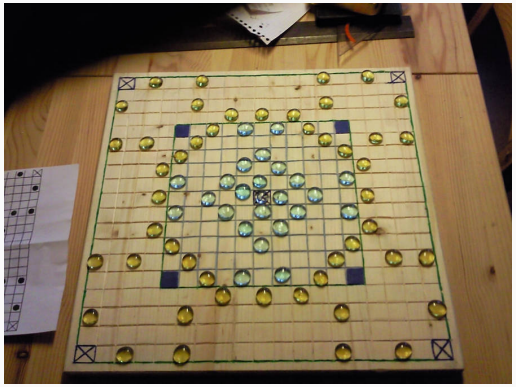


Many variants

Many variants



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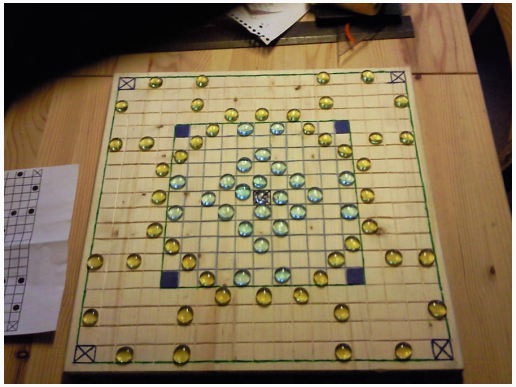
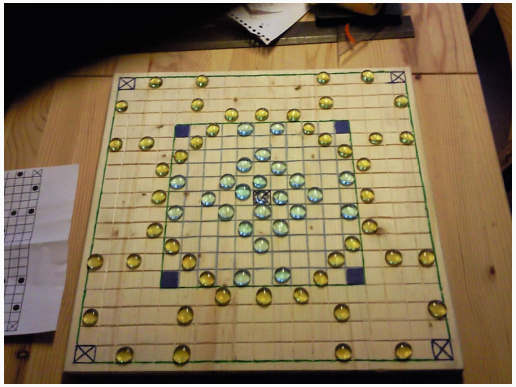


Always loopy

Many variants



Always loopy

Always partisan

This looks impartial!

This looks impartial!

Can we analyze it?

Rulesets

Game ends when king can't move (exit or captured)

Game ends when king can't move (exit or captured)

Only analyzed with king and one soldier

Game ends when king can't move (exit or captured)

Only analyzed with king and one soldier

King moves N/W

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Possible soldier movement mechanics

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- Any direction, ending closer to K

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- Any direction, ending closer to K
- Only N/W

Game ends when king can't move (exit or captured)

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King moves N/W

Possible soldier movement mechanics

- Any direction, ending closer to K
- Only N/W
- Only S/E

Game ends when king can't move (exit or captured)

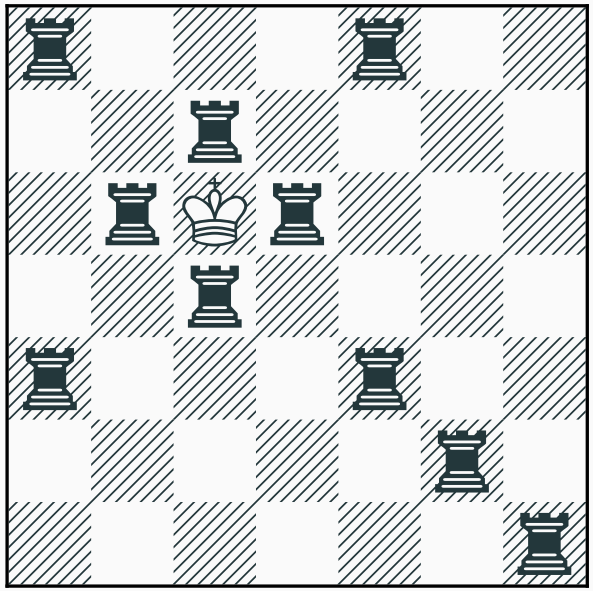
Only analyzed with king and one soldier

King moves N/W

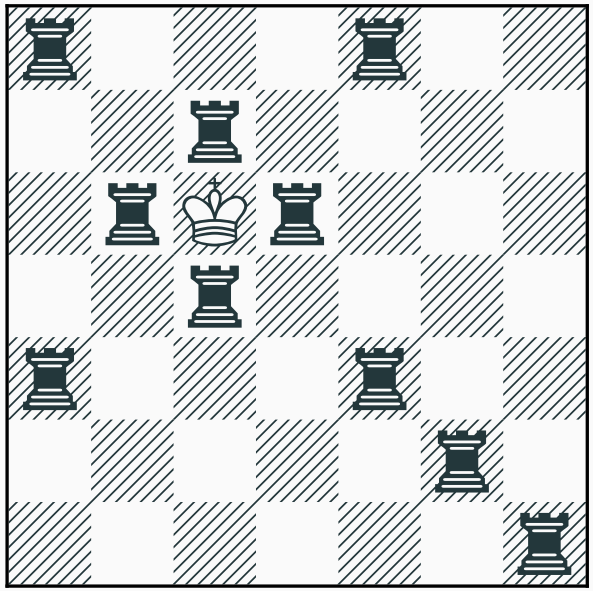
Possible soldier movement mechanics

- Any direction, ending closer to K
- Only N/W
- Only S/E
- Stay stationary

End closer to K



End closer to K



Looks simple, but

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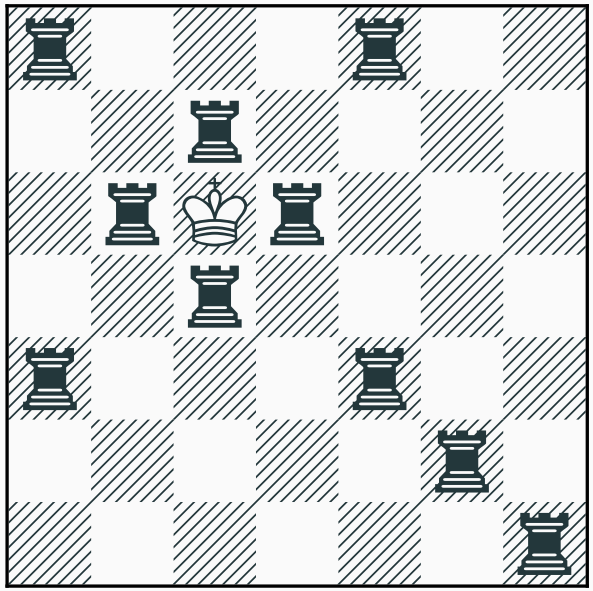

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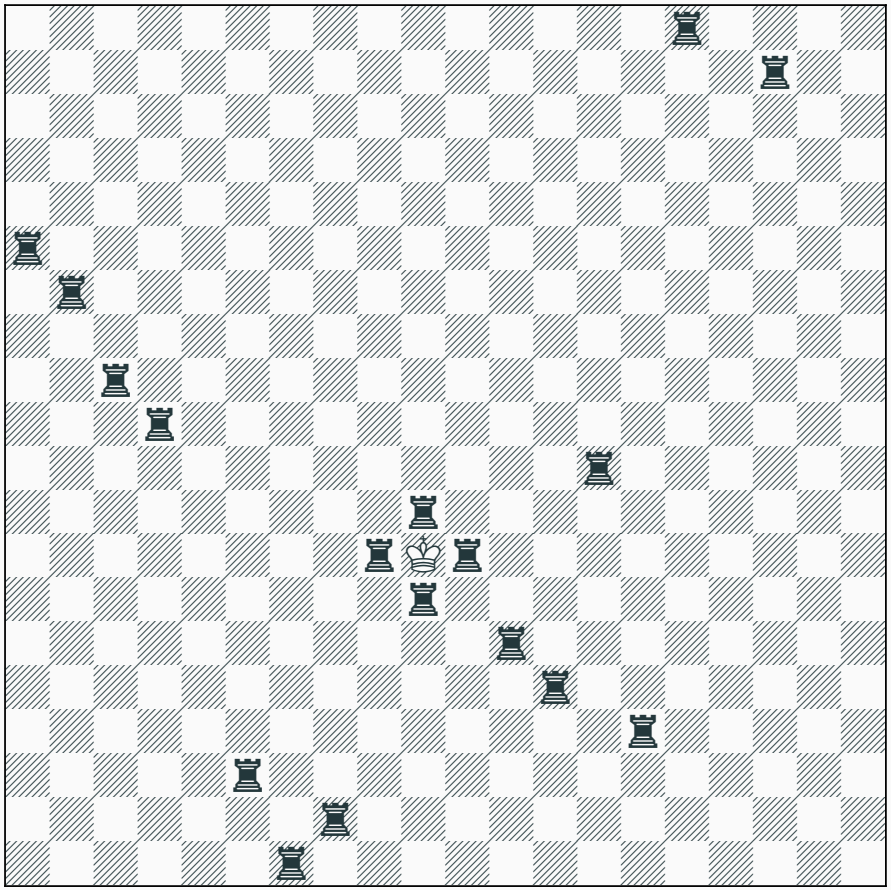
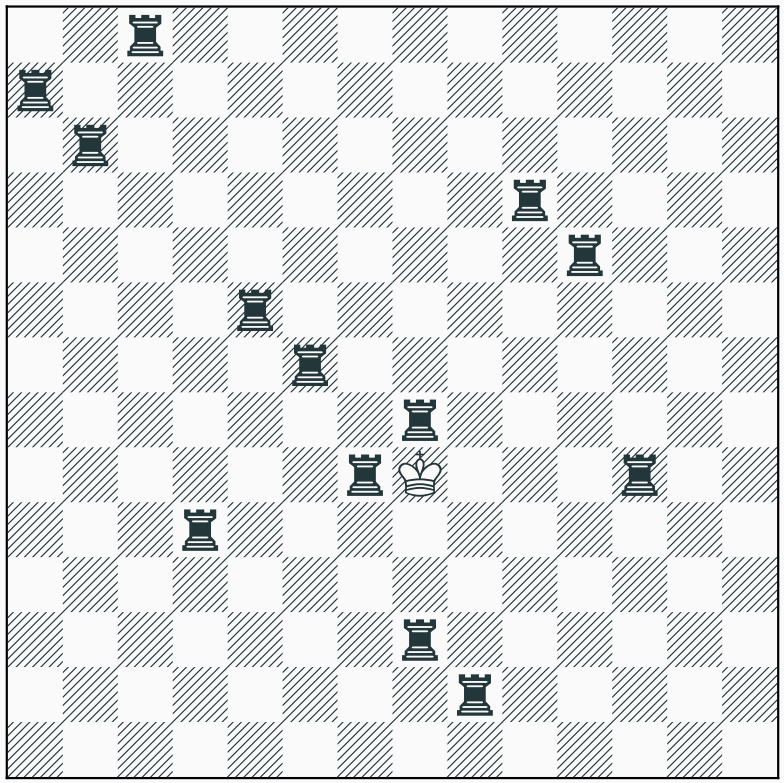


Soldier moves N/W



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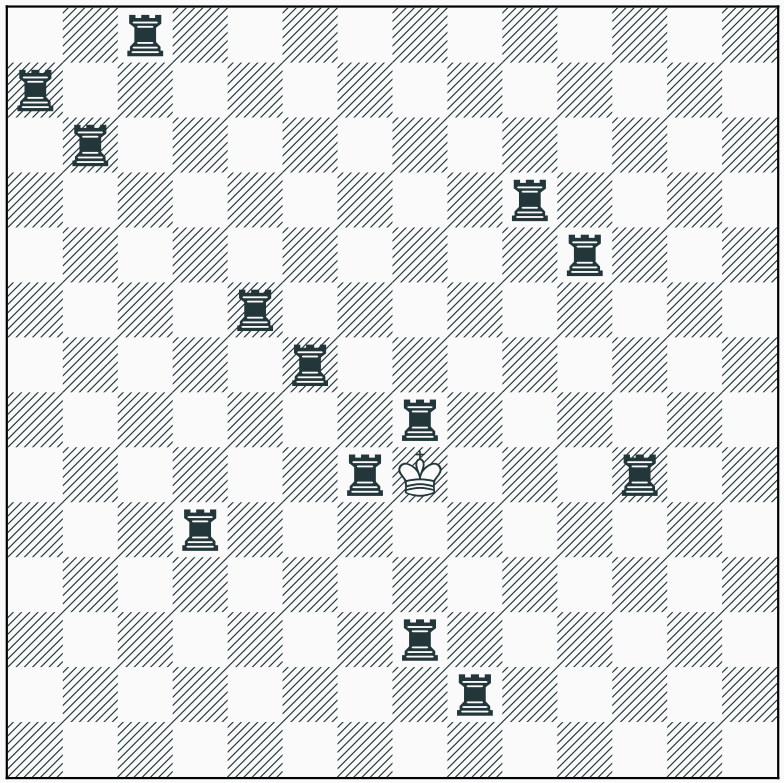

This is really just blocking nim with a strange blocking mechanic

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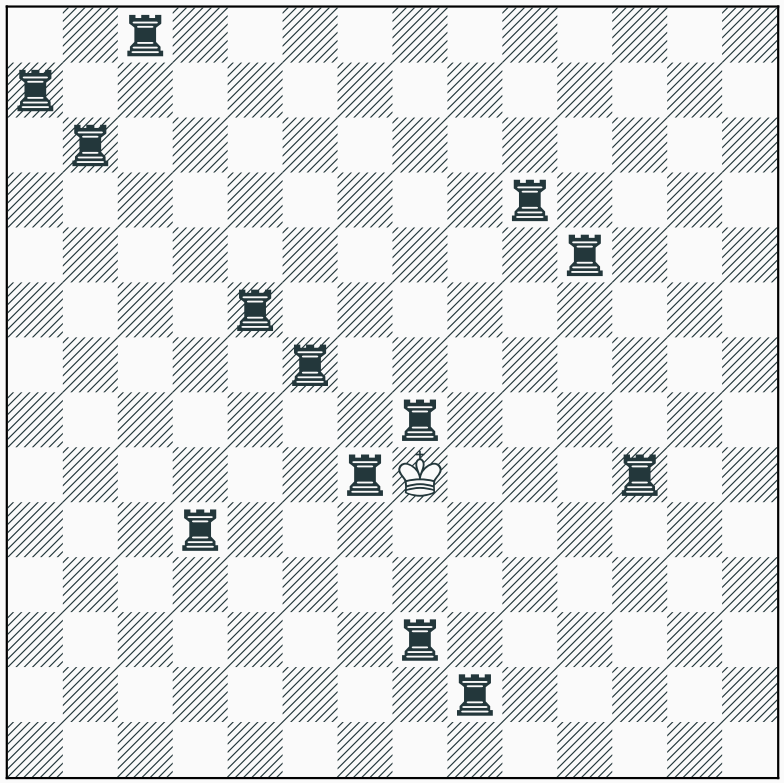


This is really just blocking nim with a strange blocking mechanic

Not analyzed

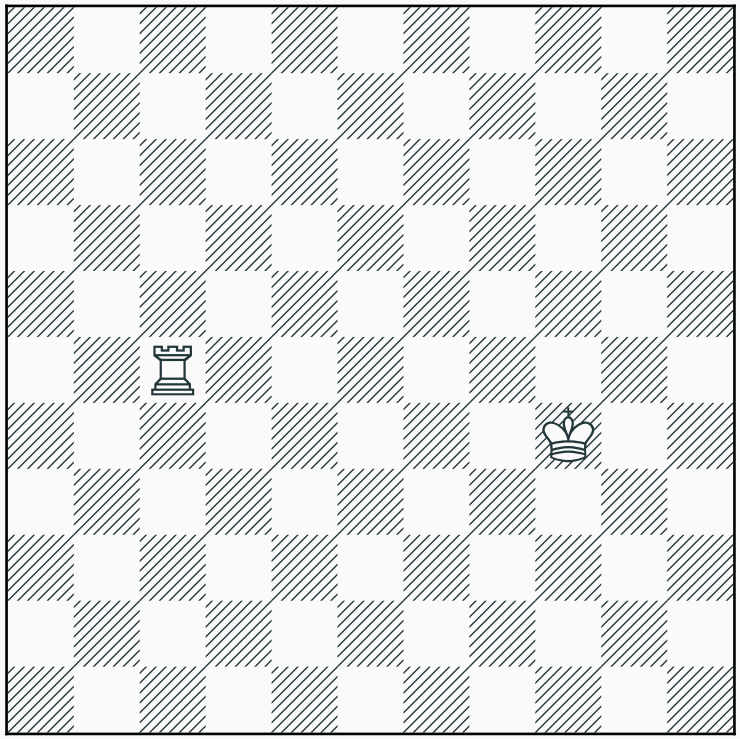
Let S move S/E, but don't pass K

Let S move S/E, but don't pass K

Why would a soldier remove themself from the coup?

Let S move S/E, but don't pass K

Why would a soldier remove themself from the coup?



K can pass soldier

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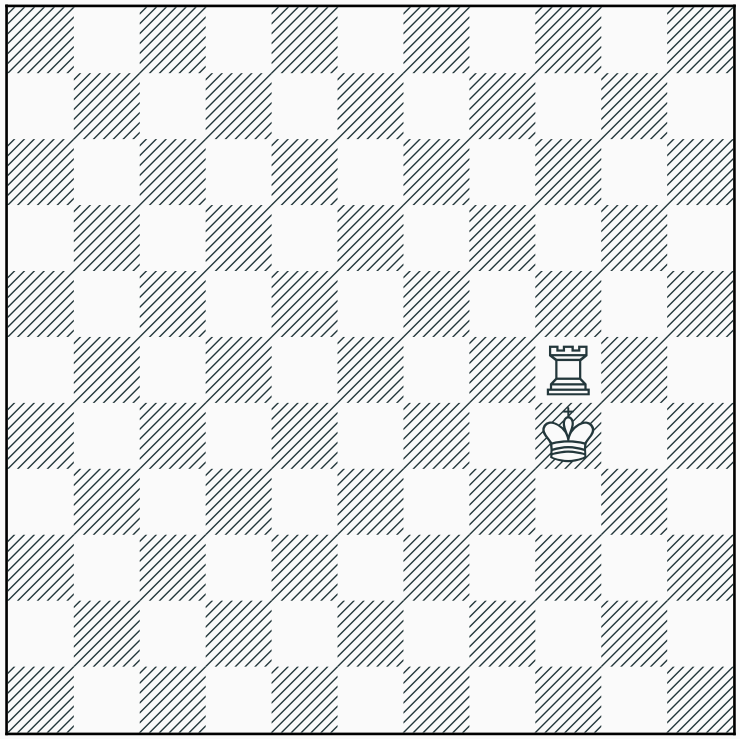

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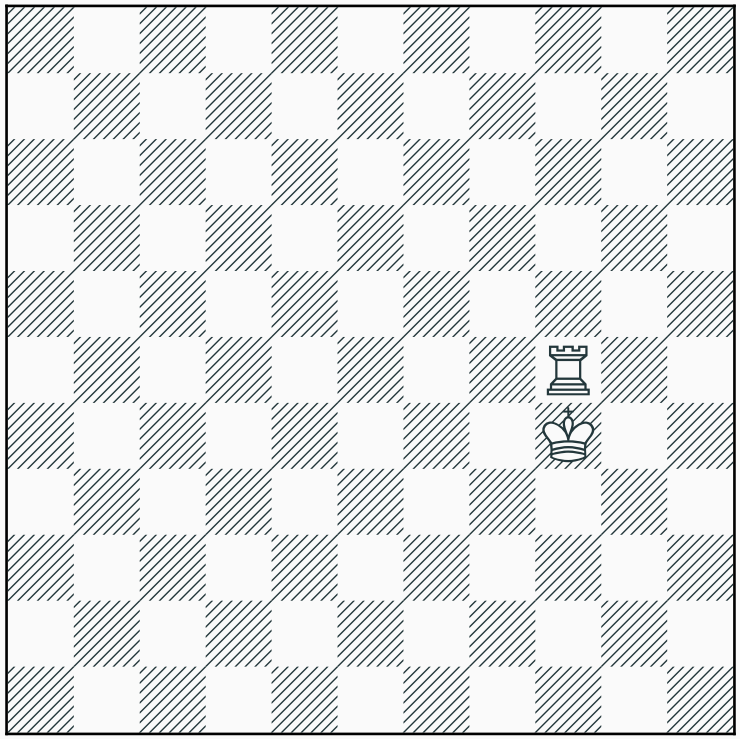

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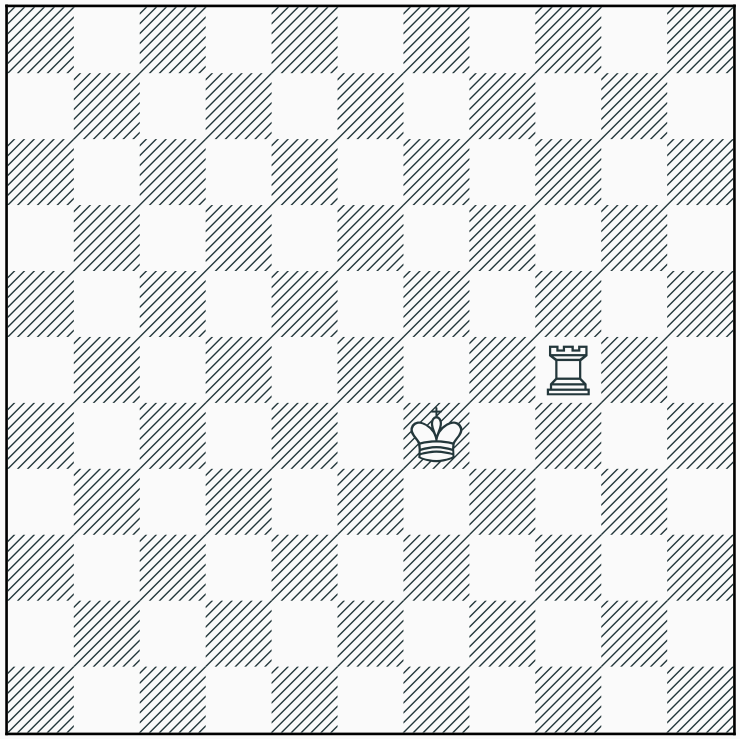
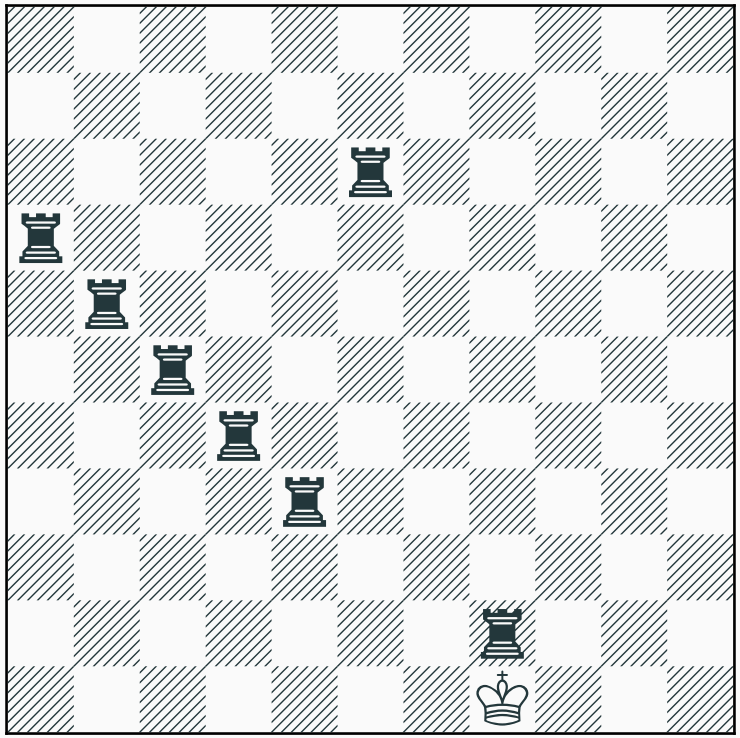


K can pass soldier

$\mathcal{P}$-positions



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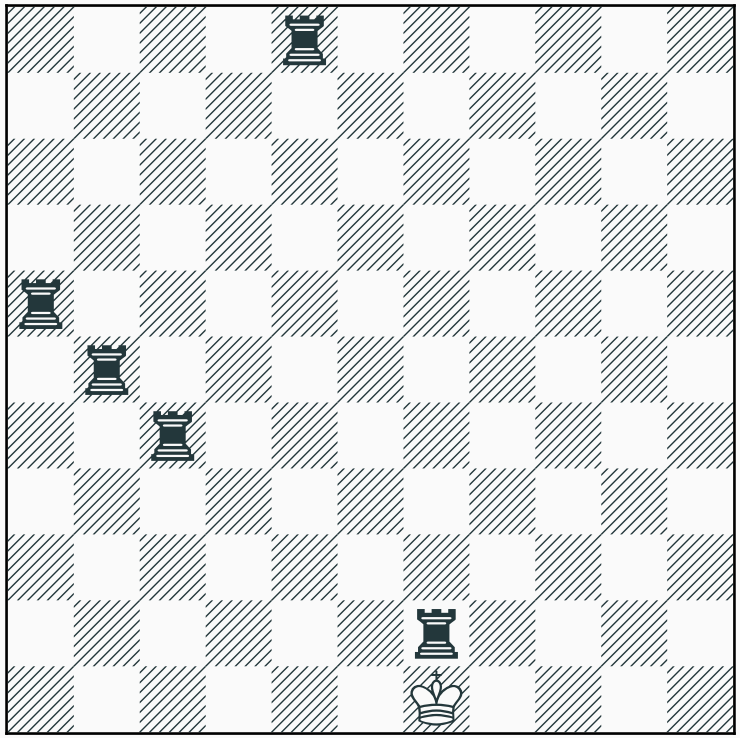

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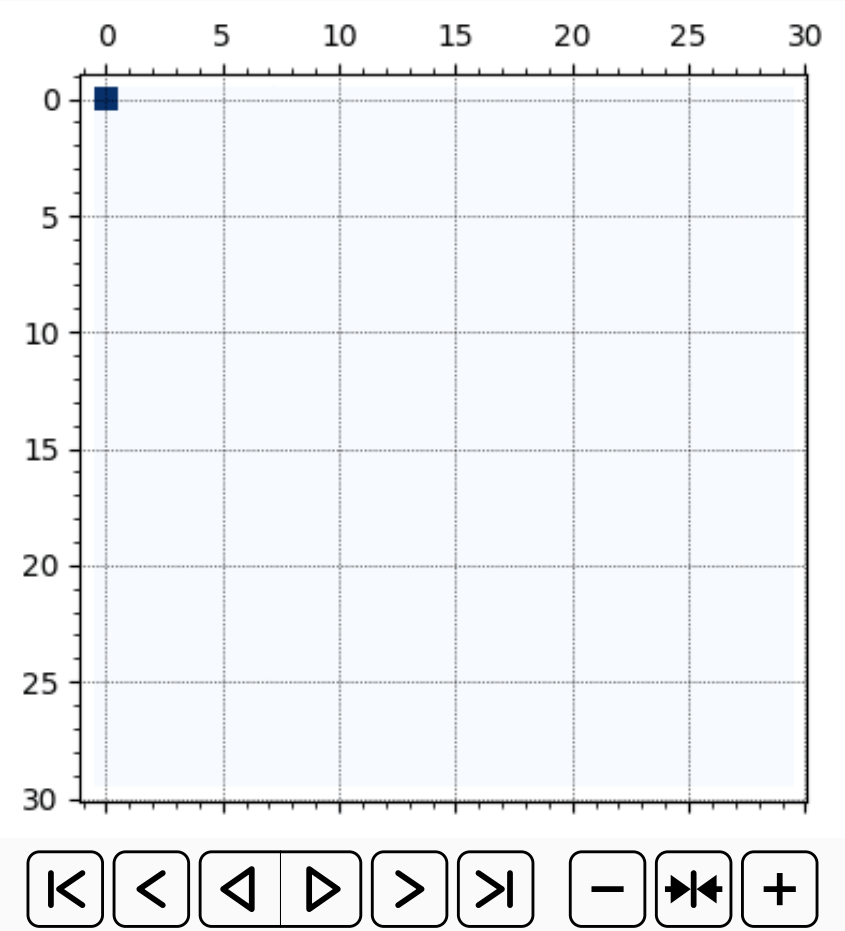

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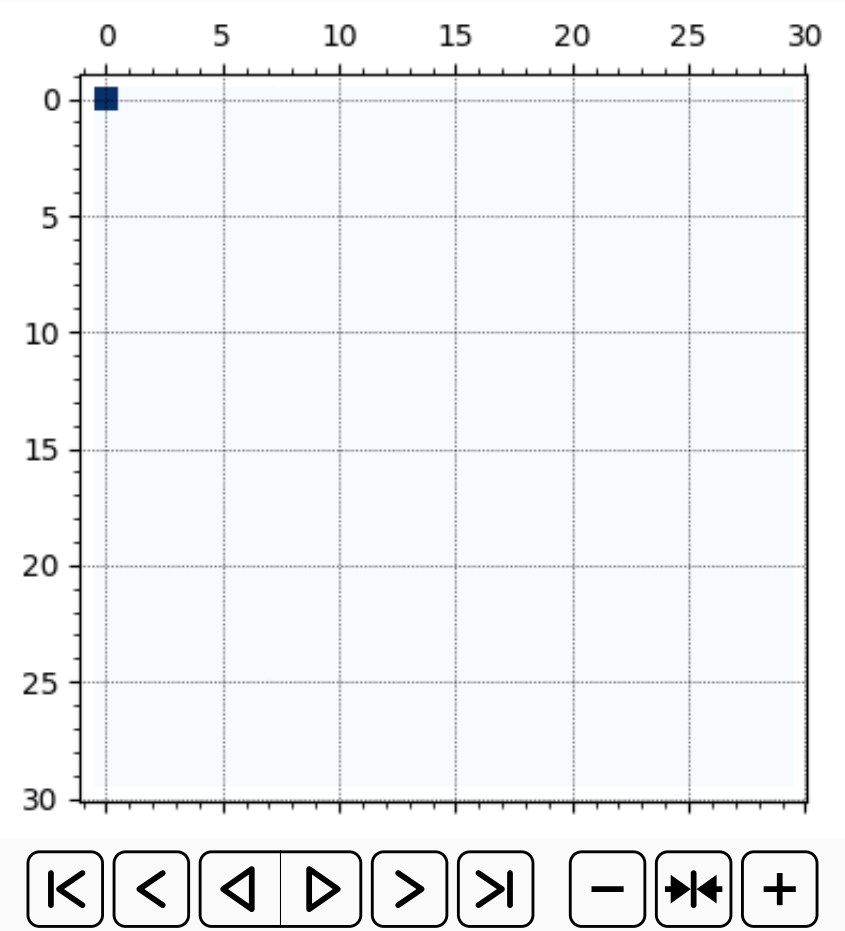
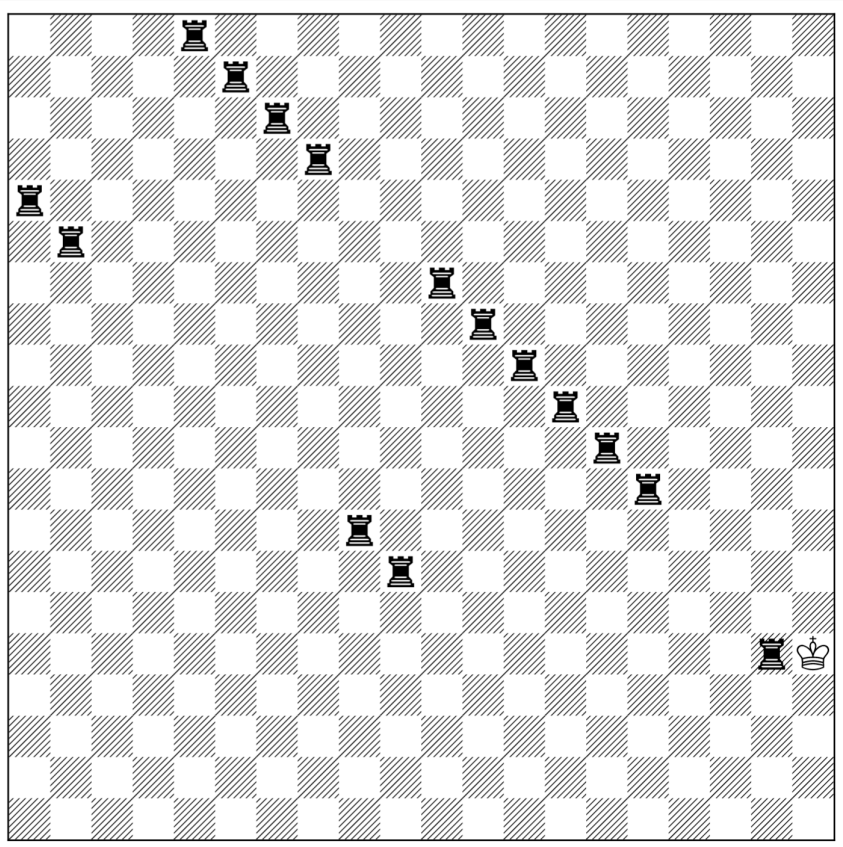


Looks modular relative to distance from main diagonal

$\mathcal{P}$-positions



Assume $a \leq b$ and $|a - b| = r$

Theorem
$(K = (a, b), S = (c, d)) \in \mathcal{P}$ *iff*

Assume $a \leq b$ and $|a - b| = r$

Theorem

$(K = (a, b), S = (c, d)) \in \mathcal{P}$ *iff*

$K = (0, b) \Rightarrow S = (0, b - 1)$

$K = (a, a) \Rightarrow S \in \{(a - 1, a), (a, a - 1), (k, k) : k < (a - 1)\}$

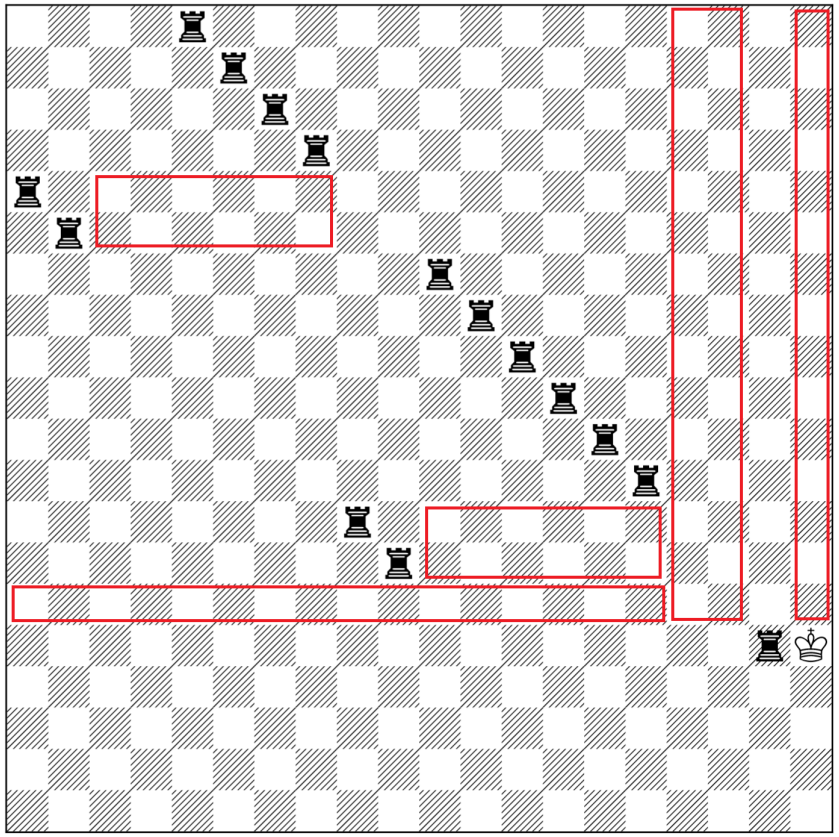
$K = (a - 1, a) \Rightarrow S \in \{(a - 1, a - 1), (k - 1, k) : 1 \leq k \leq (a - 2)\}$

$K = (a - 2, a) \Rightarrow S \in \{(a - 2, a - 1), (k - 2, k) : 2 \leq k \leq (a - 2)\}$

Otherwise $S \in \{(a, b - 1)\} \cup$

$\{(a - 1 - 2kr - i, b - 1, 2kr - i) : (r - 1) \leq i \leq 2r, k \geq 0\} \cup$

$\{(a - 1 - 2kr - i, b - 1 - 2(k + 1)r - i) : 1 \leq i \leq (r - 2), k \geq 0\}$

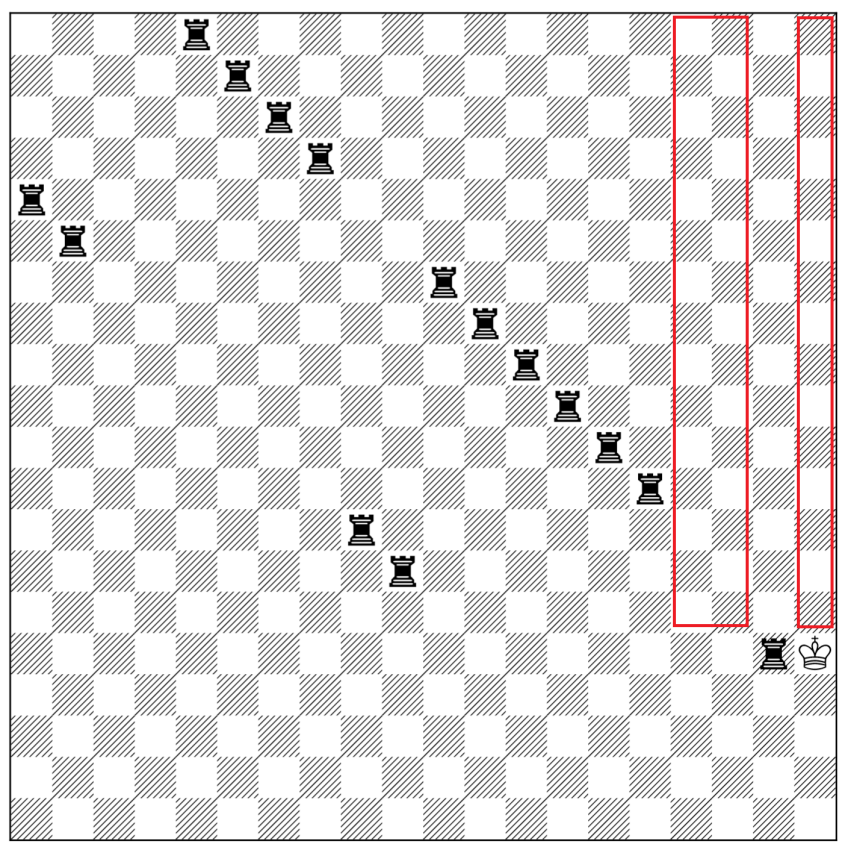


$$H = \{(a-1, i) : i \leq b - r\}$$

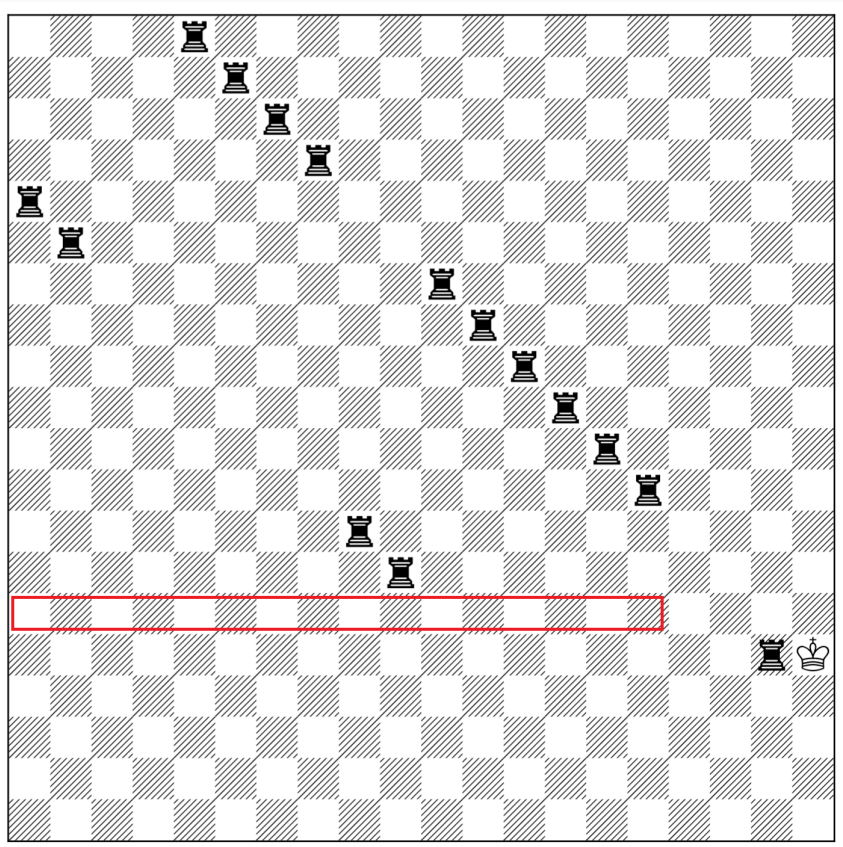
$$V_1 = \{(i, b) : i \leq a\}$$

$$V_2 = \{(i, j) : i \in [0, a-1], j \in [b-1-r, b-2]\}$$

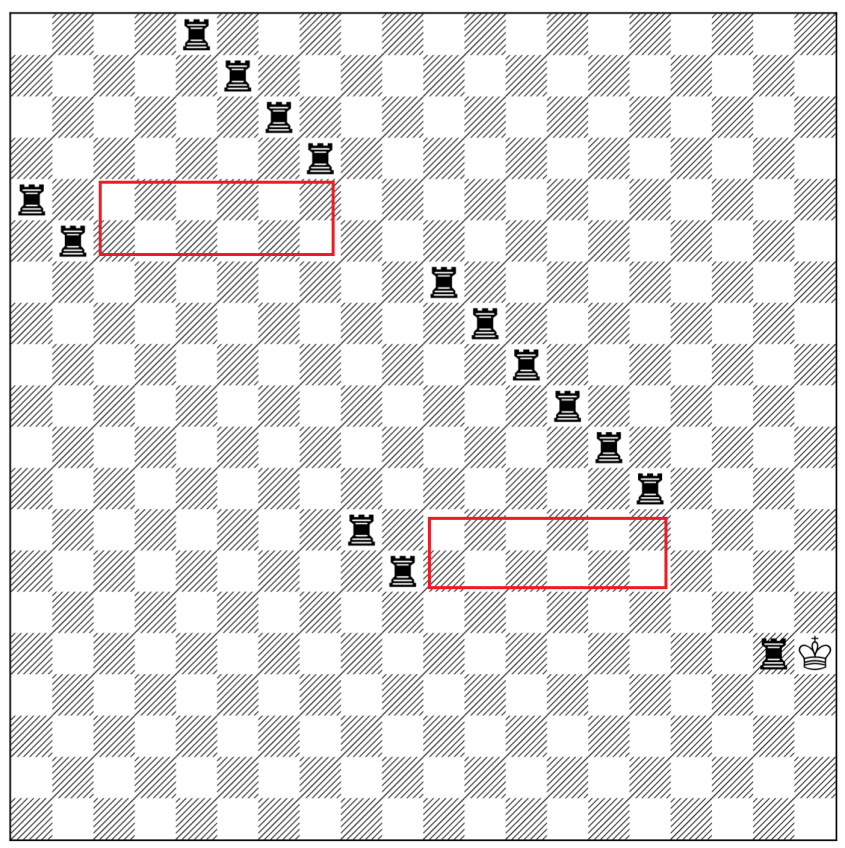
$$R = \{(a-1-2kr-i, b-1-2kr-j) :$$
$$1 \leq i \leq (r-2), (r-1) \leq j \leq 2r, k \geq 0\}$$



K moves to (a, a), removing soldier from play



K moves West next to S



K moves West to diagonal from S, or off-diagonal as needed.

If King moves all responses to $\mathcal{P}$ are analogous $\square$

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What if the soldiers are stationary?

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What if the soldiers are stationary?

Variant of Blocking Nim

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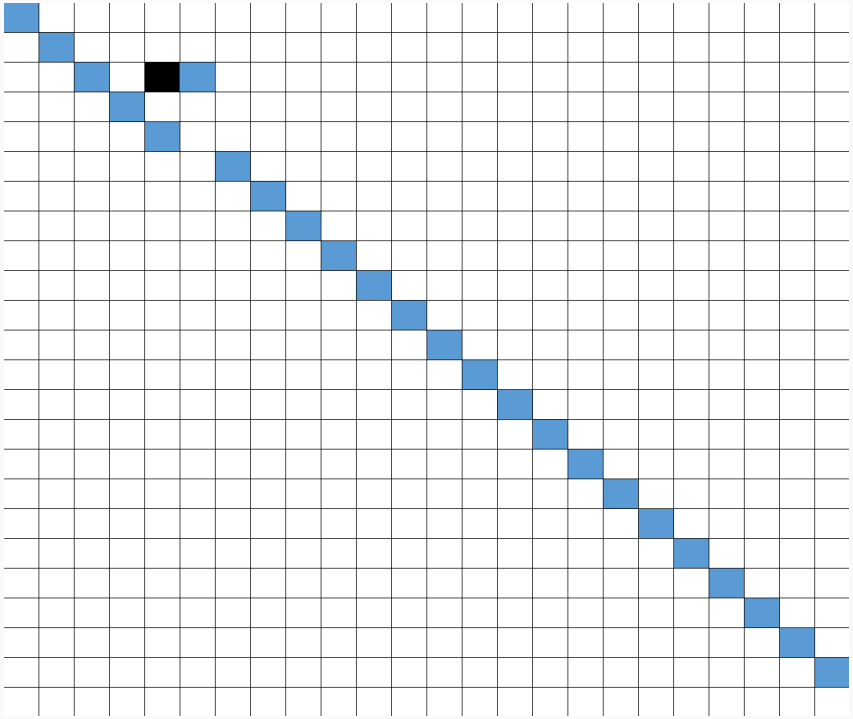
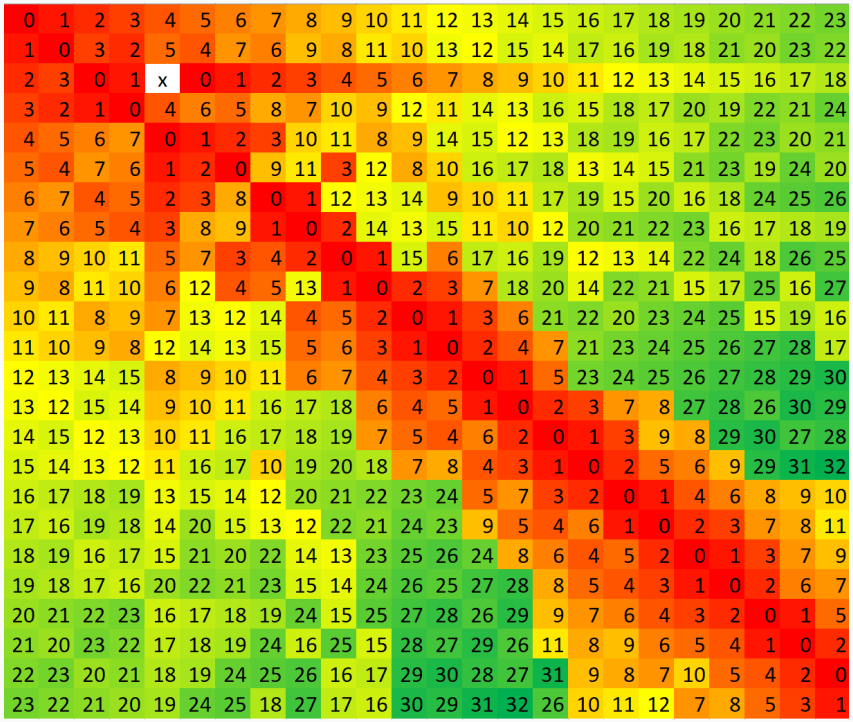


If King moves all responses to $\mathcal{P}$ are analogous $\square$

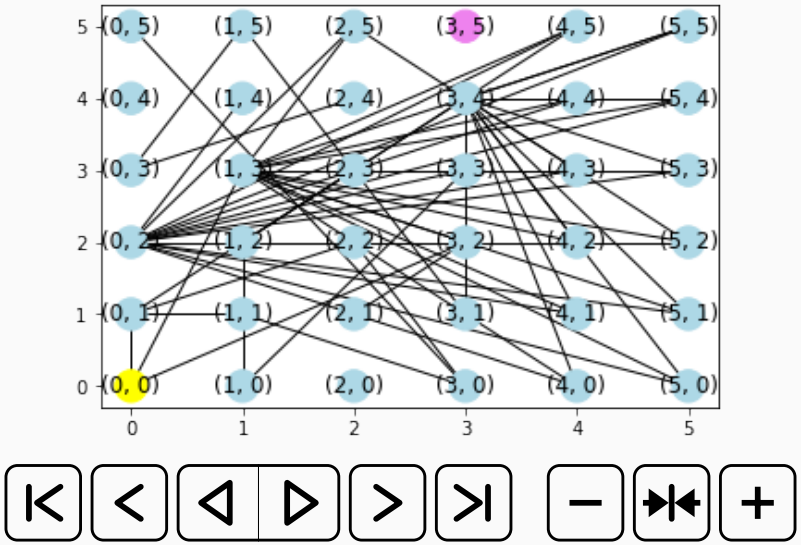
What if the soldiers are stationary?

Variant of Blocking Nim

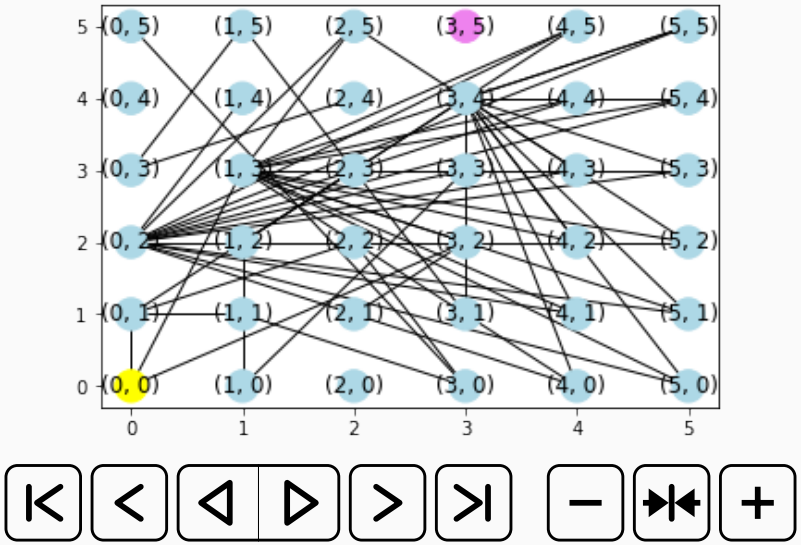


Next steps

Fun game!

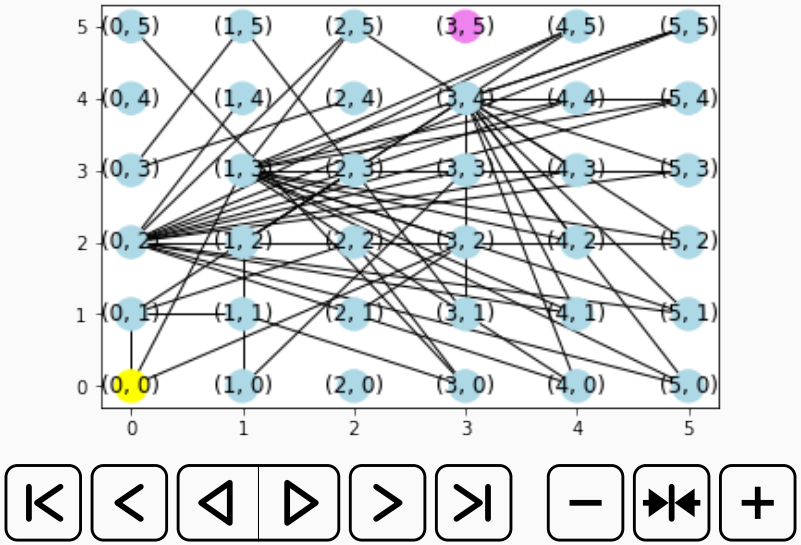

(0, 5) (1, 5) (2, 5) (3, 5) (4, 5) (5, 5)
(0, 4) (1, 4) (2, 4) (3, 4) (4, 4) (5, 4)
(0, 3) (1, 3) (2, 3) (3, 3) (4, 3) (5, 3)
(0, 2) (1, 2) (2, 2) (3, 2) (4, 2) (5, 2)
(0, 1) (1, 1) (2, 1) (3, 1) (4, 1) (5, 1)
(0, 0) (1, 0) (2, 0) (3, 0) (4, 0) (5, 0)
0 1 2 3 4 5
5 4 3 2 1 0

Fun game! What's next?



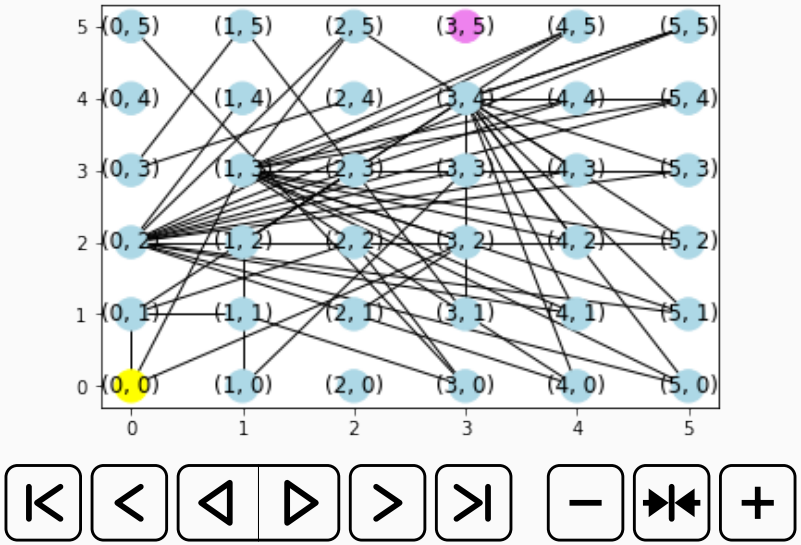
Fun game! What's next?

Multiple soldiers?



Fun game! What's next?

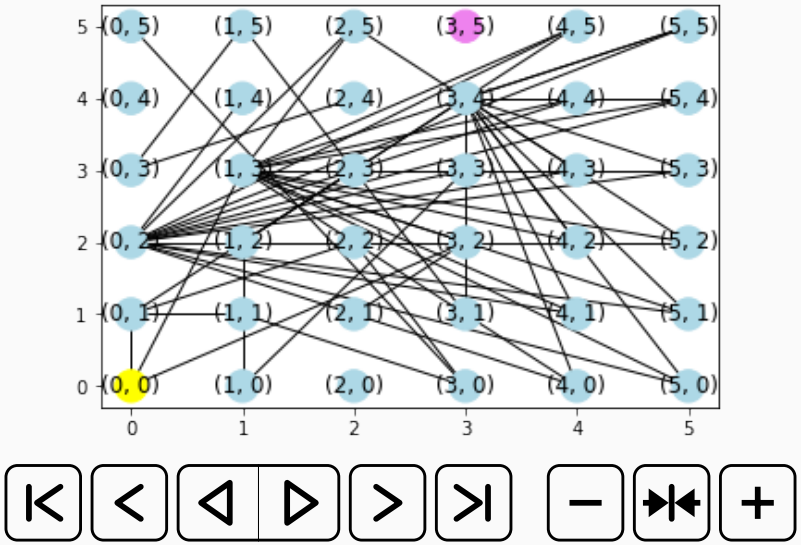
Multiple soldiers?



Values for main ruleset?

Fun game! What's next?

Multiple soldiers?

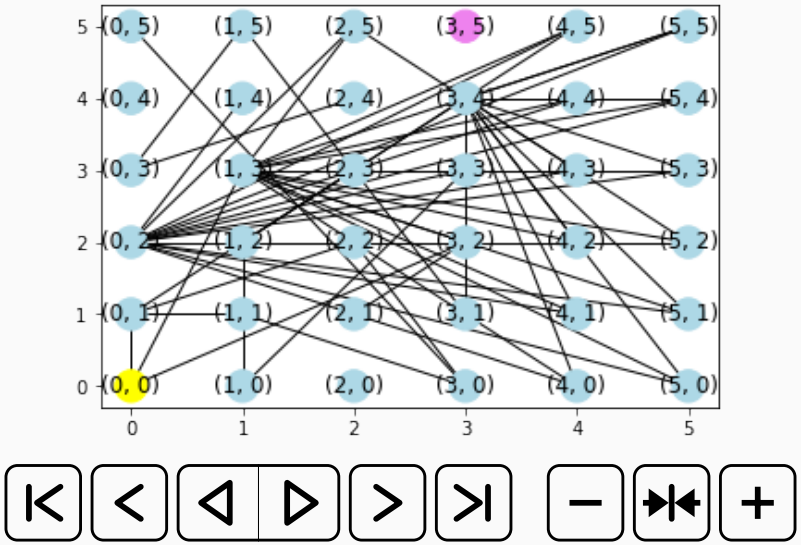


Values for main ruleset?

How to generalize the board to a graph?

Fun game! What's next?

Multiple soldiers?



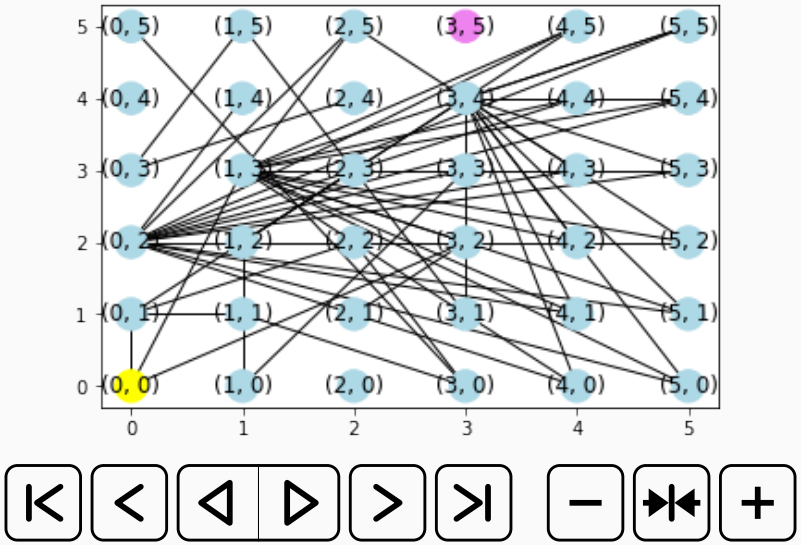
Values for main ruleset?

How to generalize the board to a graph?

Who cares?

Fun game! What's next?

Multiple soldiers?



Values for main ruleset?

How to generalize the board to a graph?

Who cares? Seriously, tell me who cares.