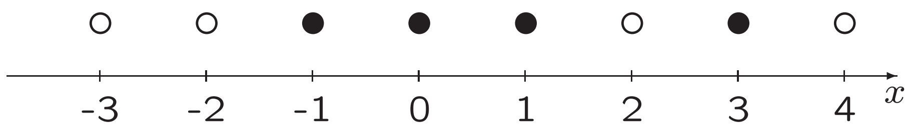
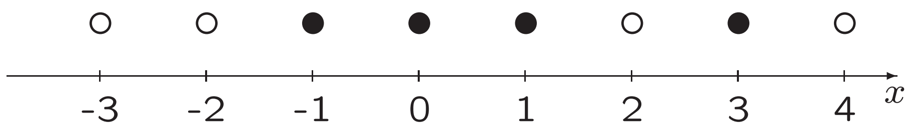
TASEP and the corner growth model

TASEP: Interacting particles



Bernoulli(ϱ) distribution

TASEP: Interacting particles



Bernoulli(ϱ) distribution

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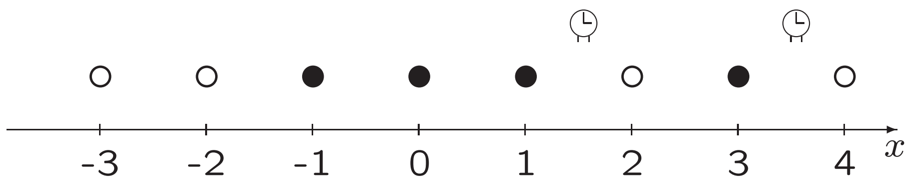

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That is: waiting times ◷ $\sim$ Exponential(1).

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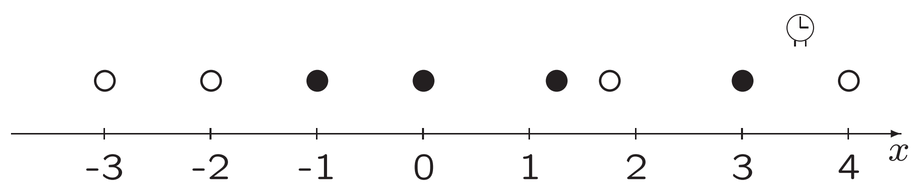

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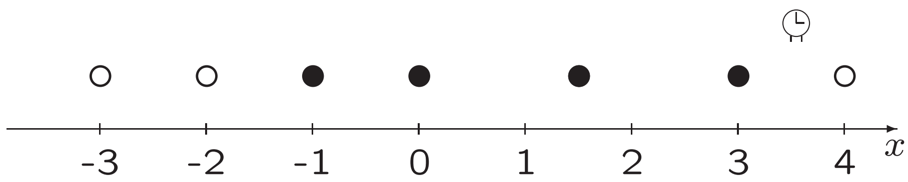

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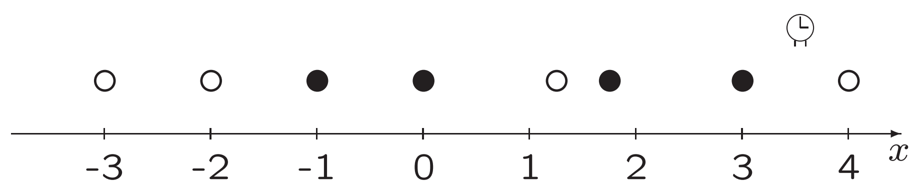

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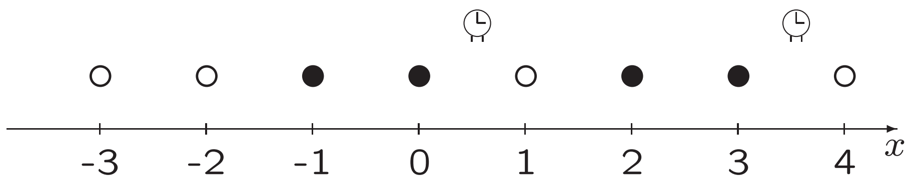

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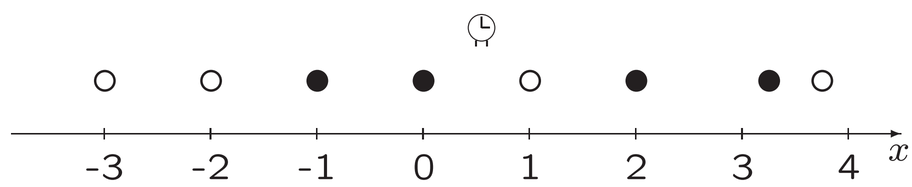

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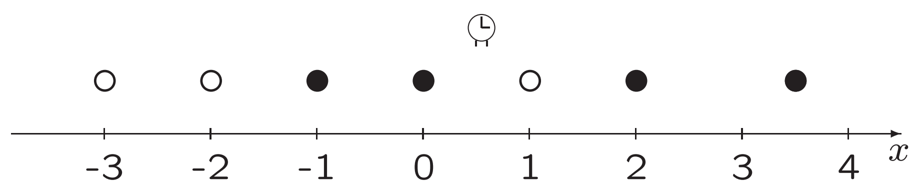

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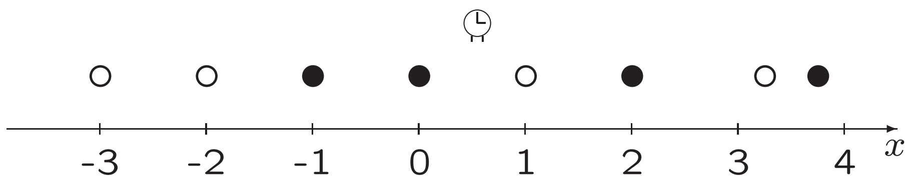

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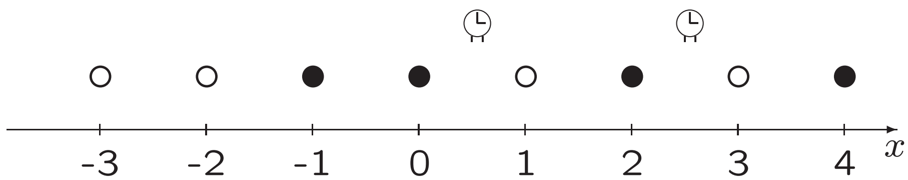

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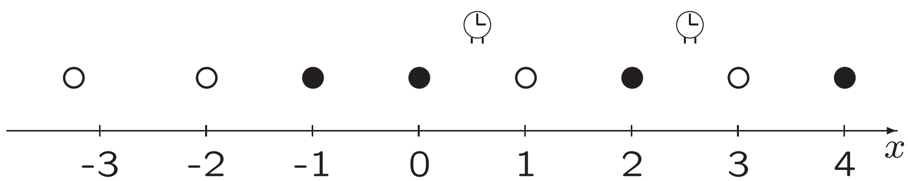

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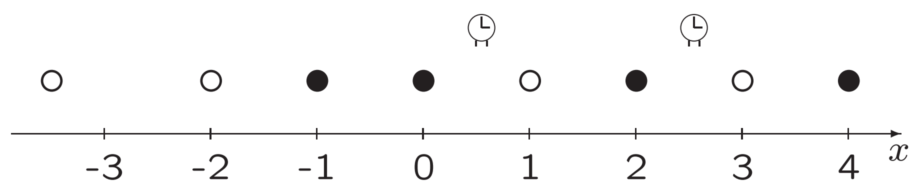

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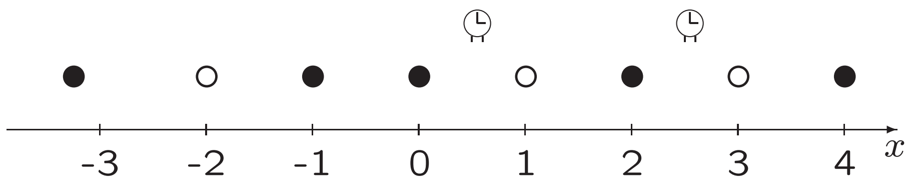

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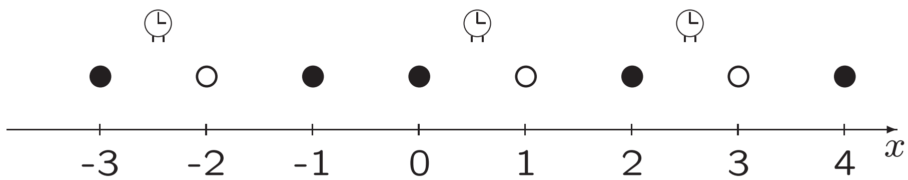

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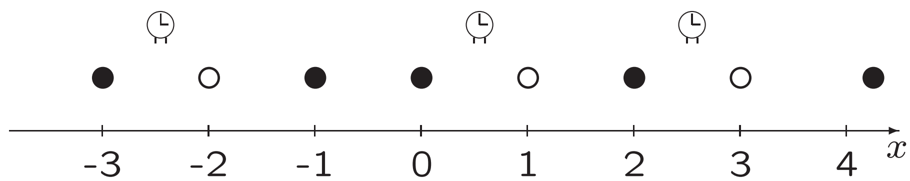

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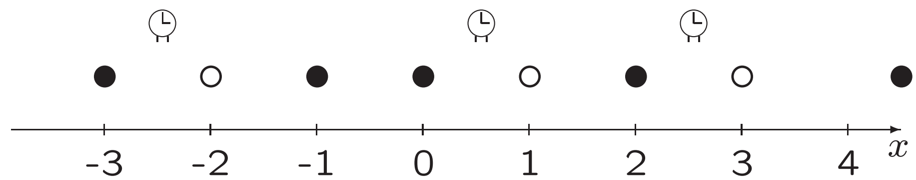

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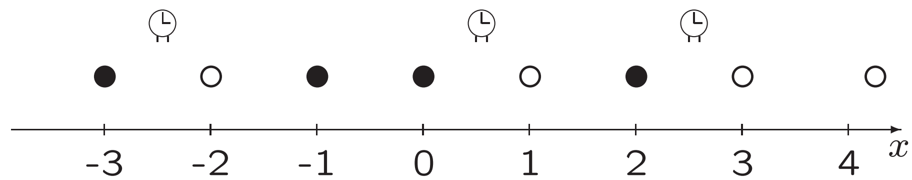

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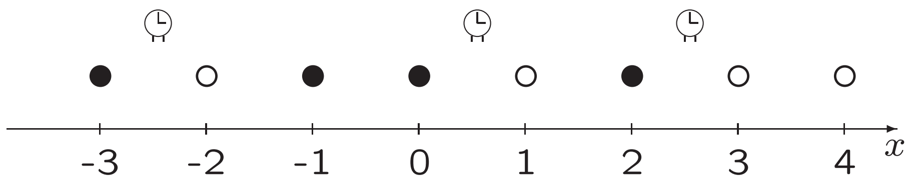

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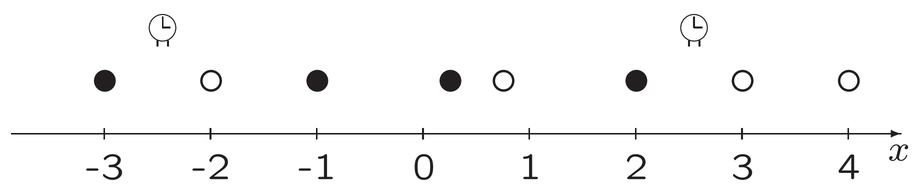

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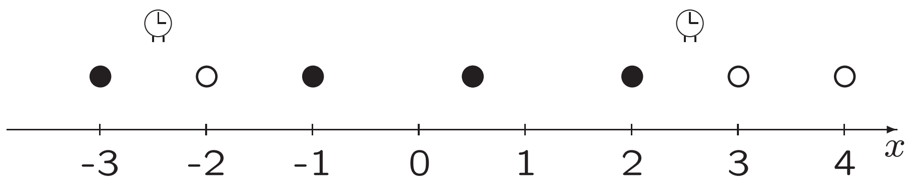

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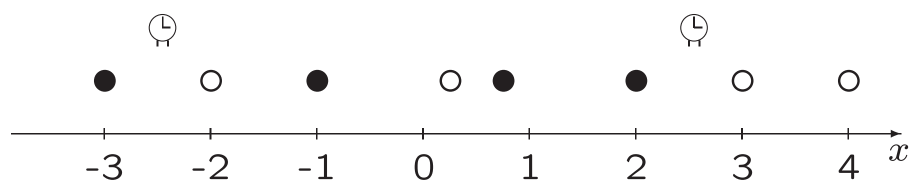

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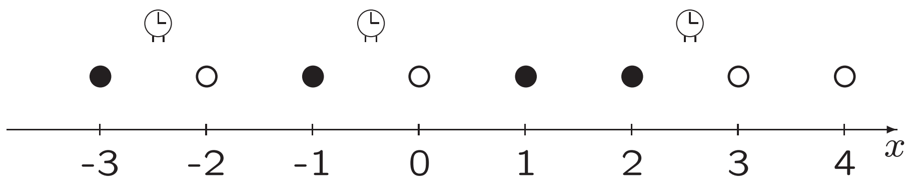

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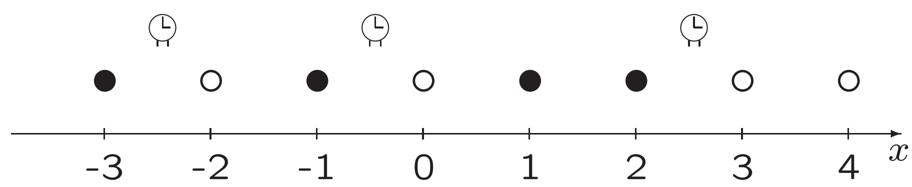

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$\rightsquigarrow$ Markov process.

Particles try to jump to the right, but block each other.

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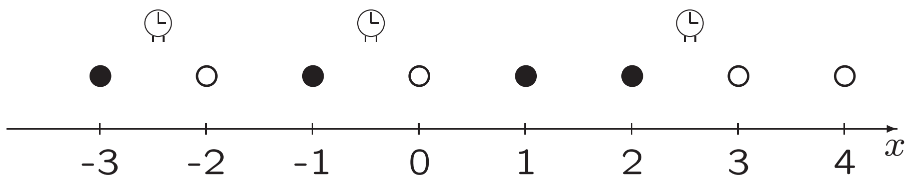

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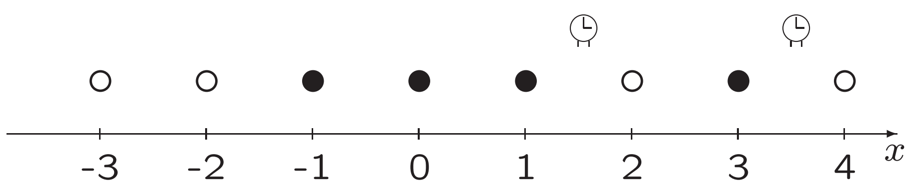
The Bernoulli(ϱ) distribution is time-stationary for any ($0 \leq \varrho \leq 1$). Any translation-invariant stationary distribution is a mixture of Bernoullis.

TASEP: Surface growth



Bernoulli(ϱ) distribution

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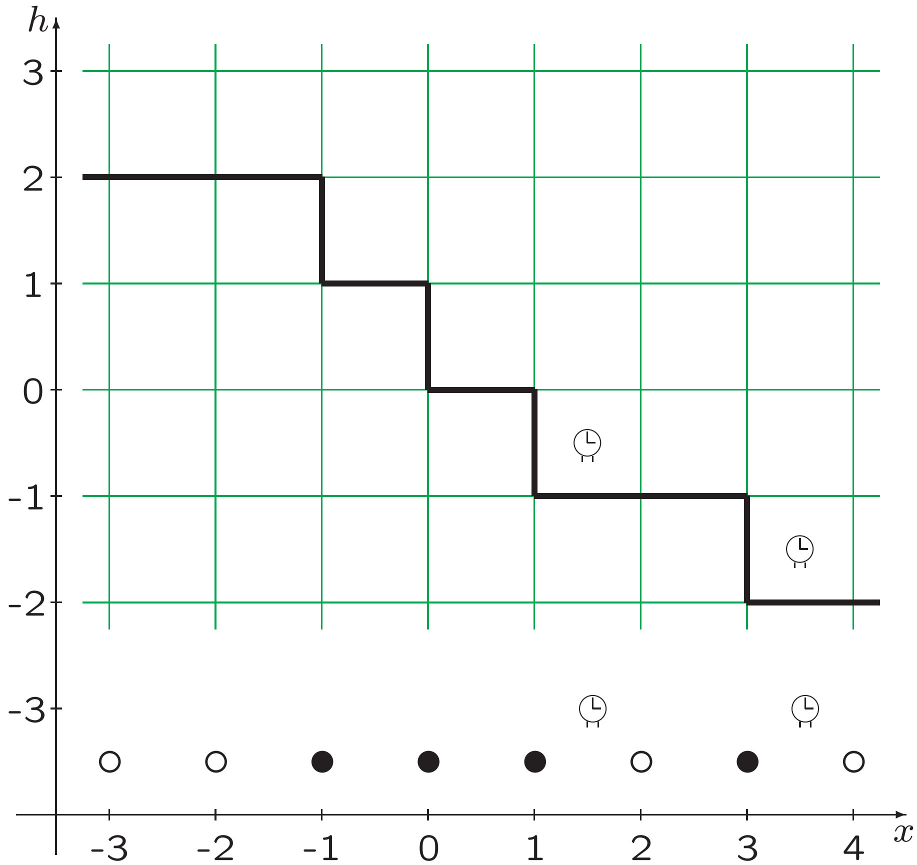

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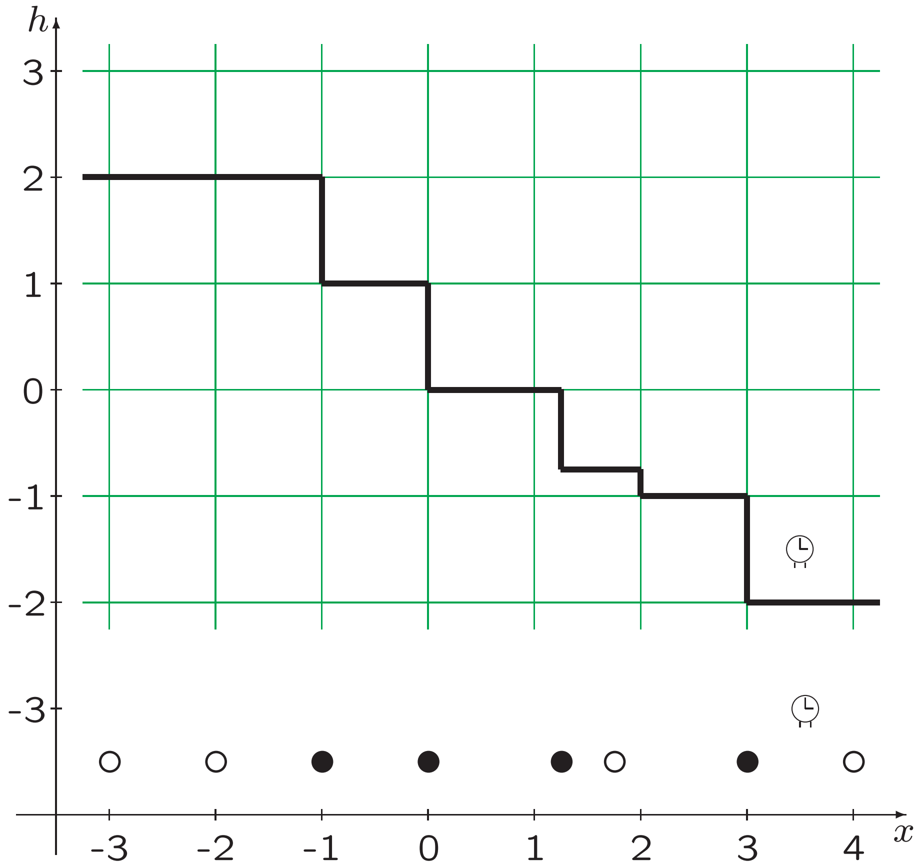

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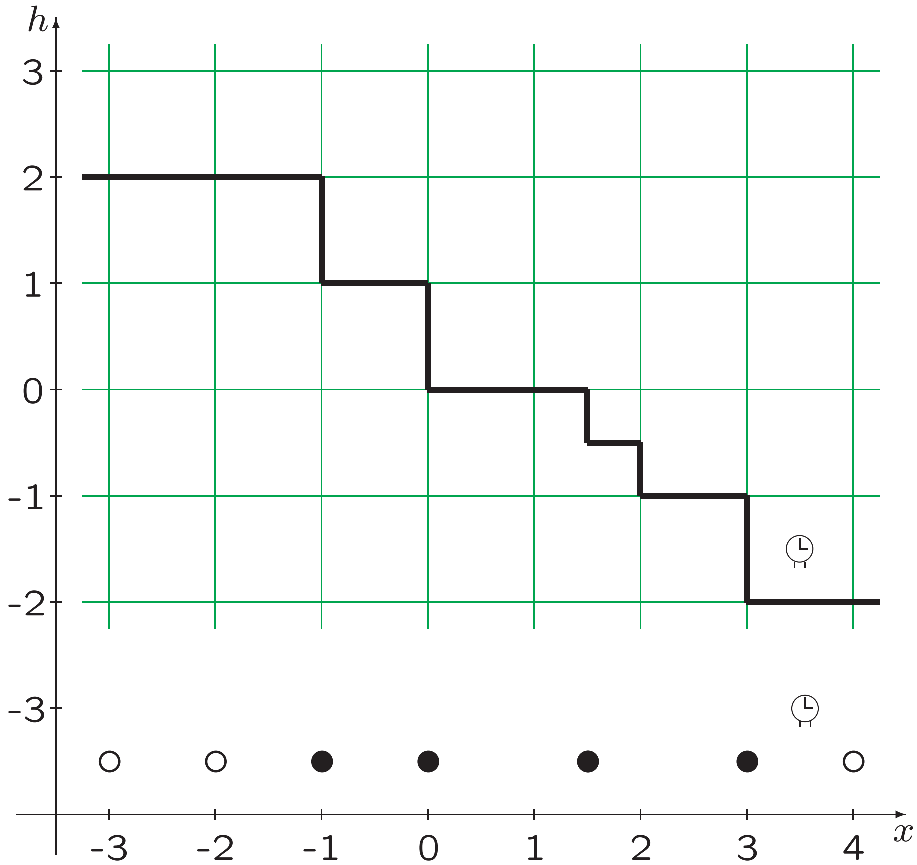

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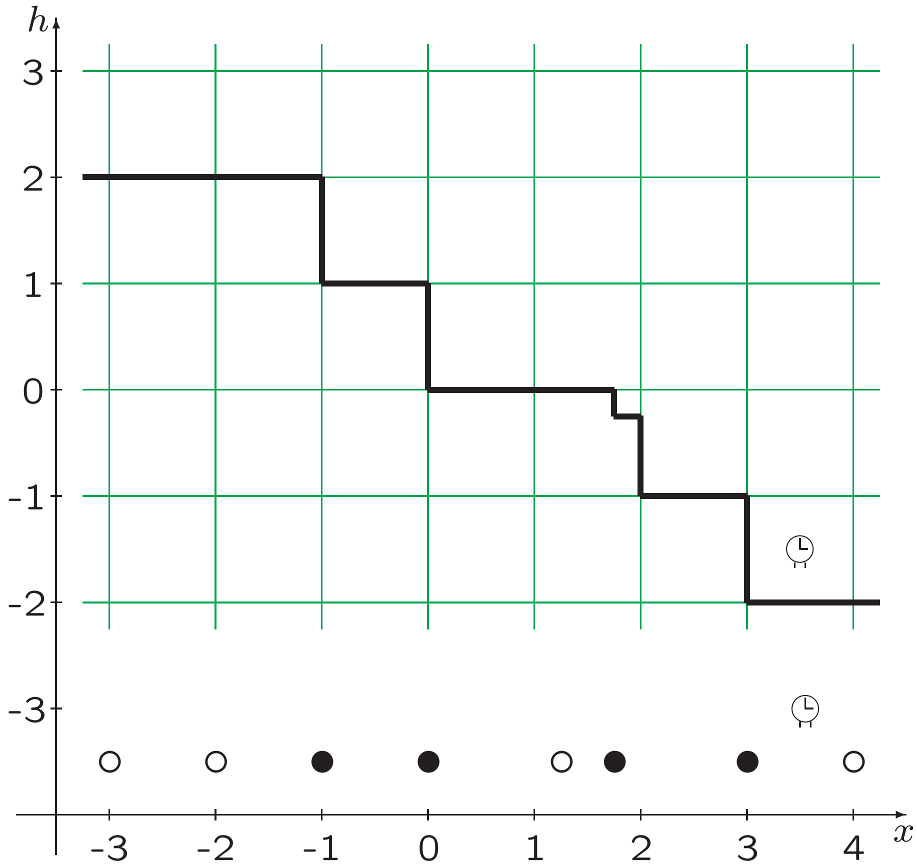

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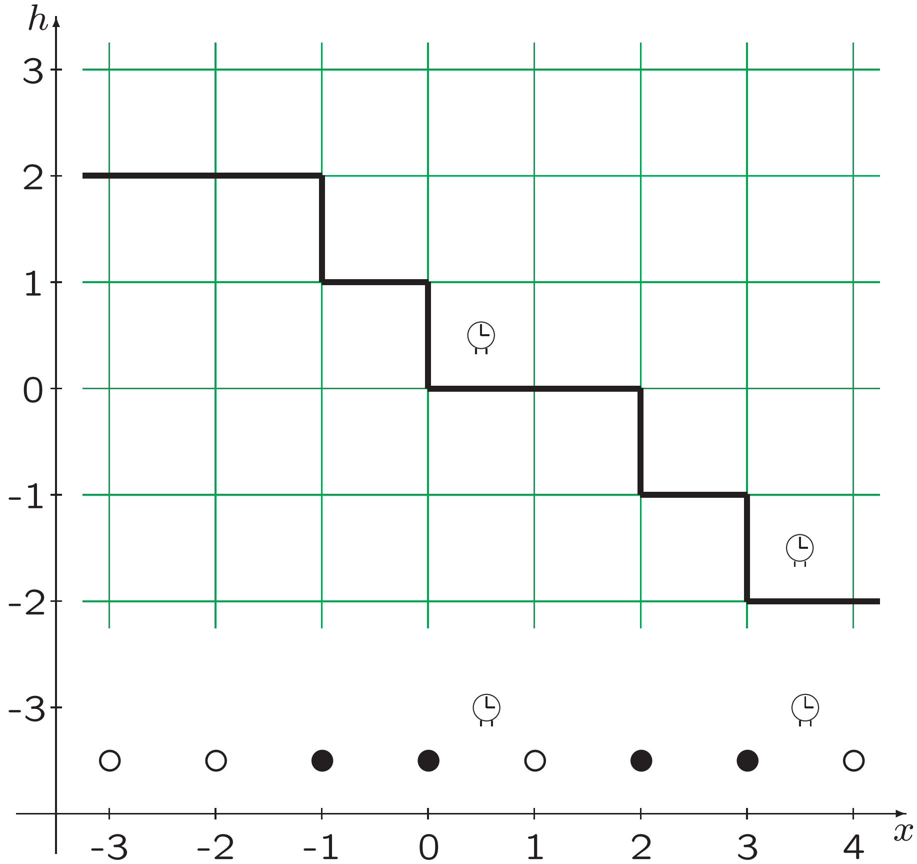

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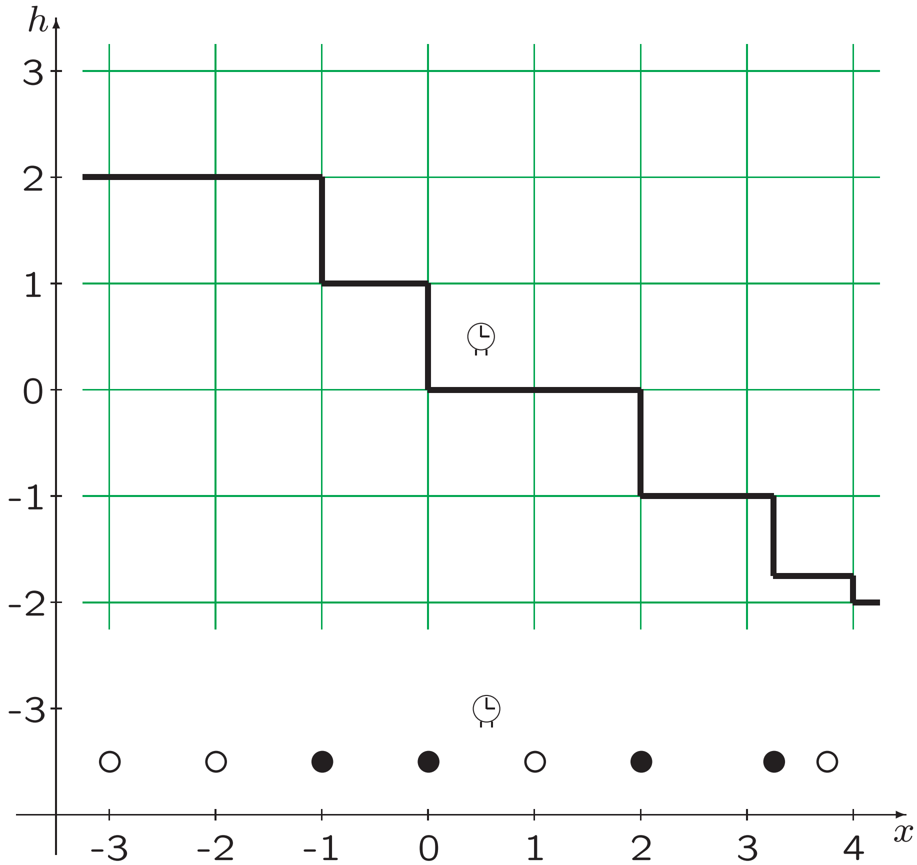

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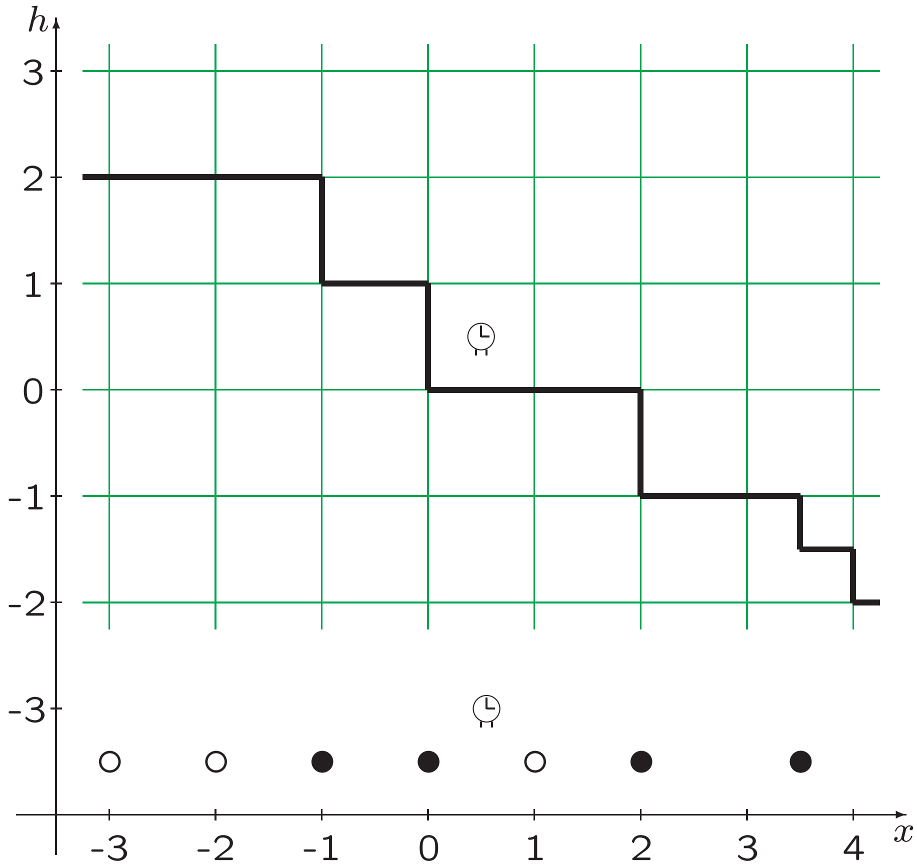

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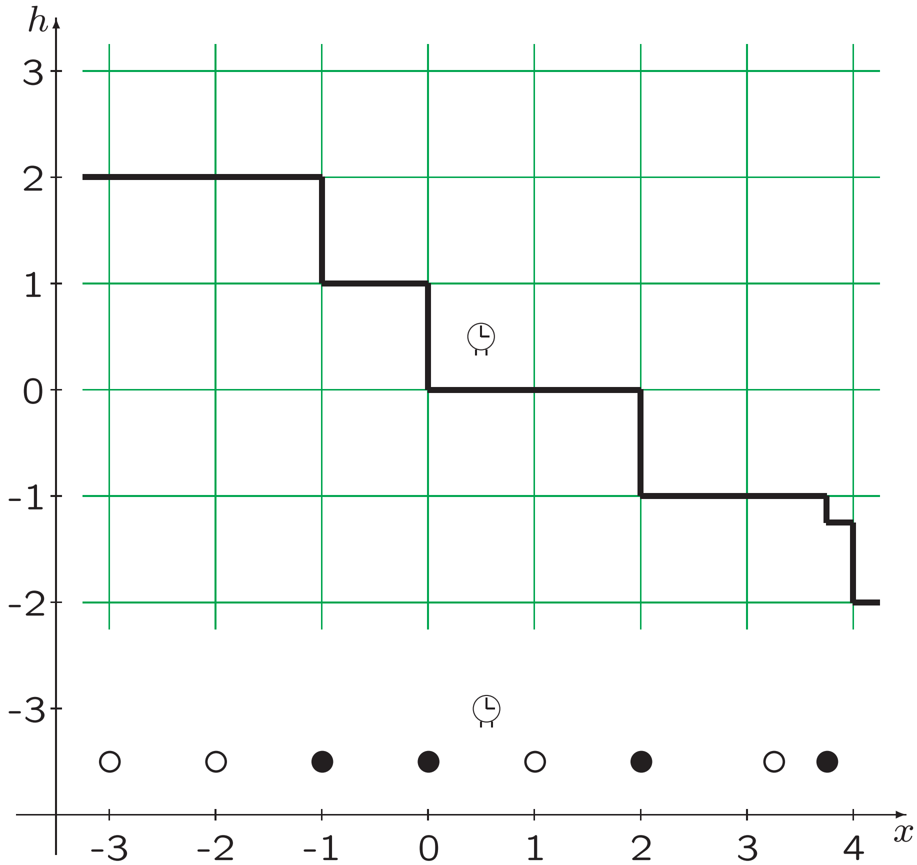

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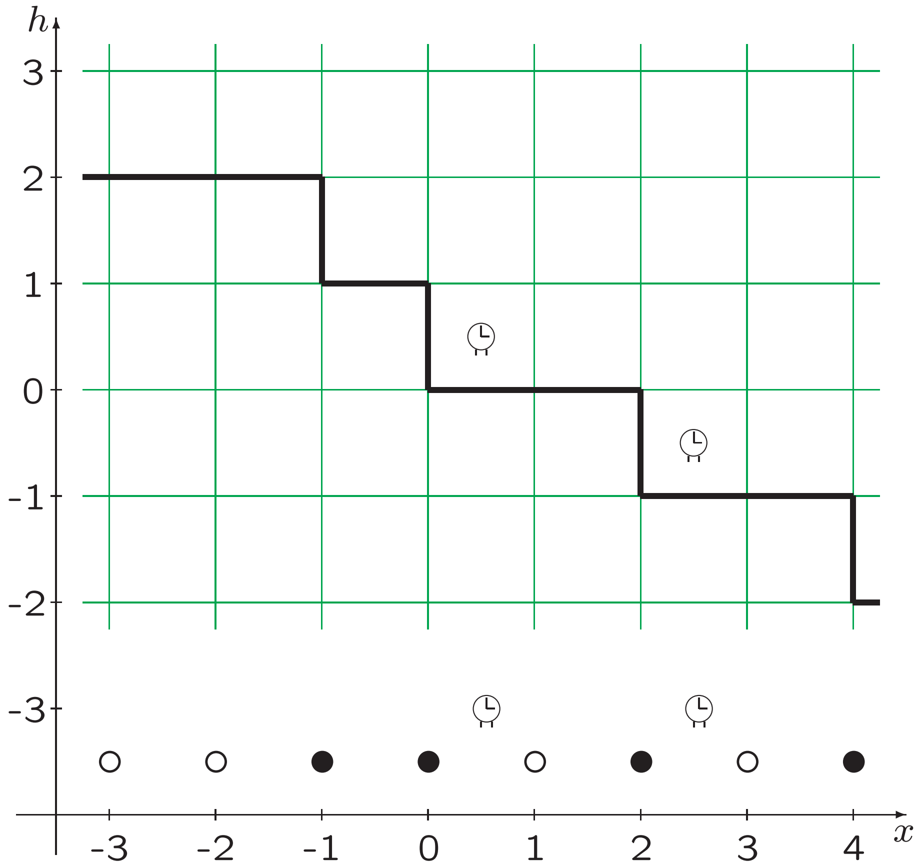

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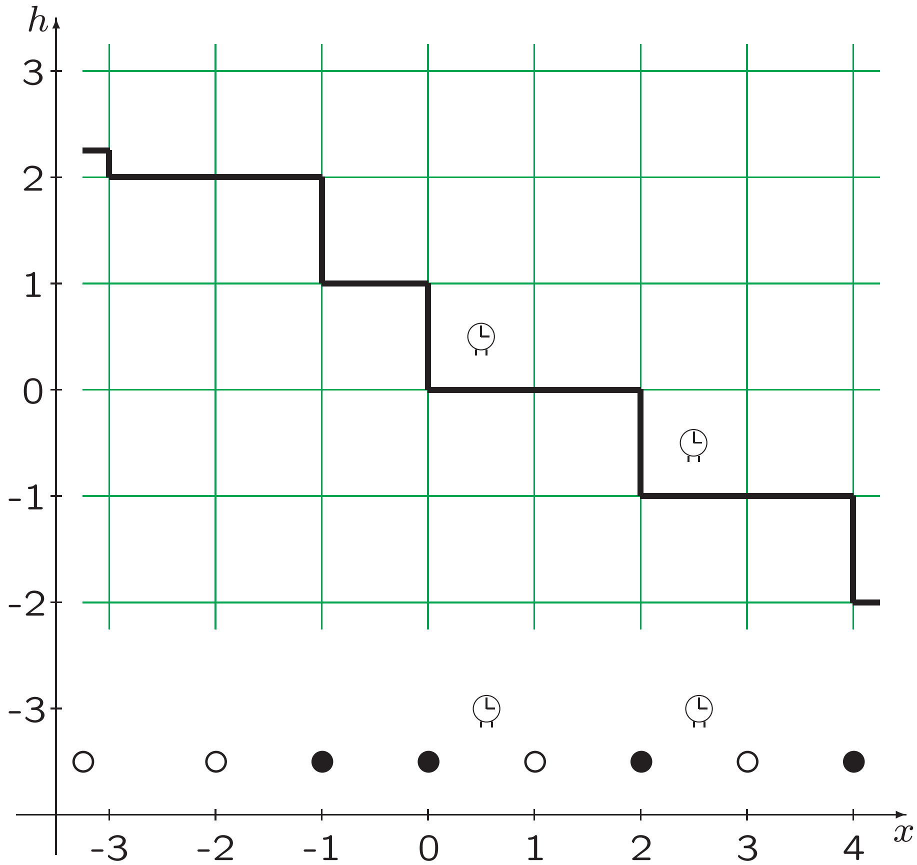

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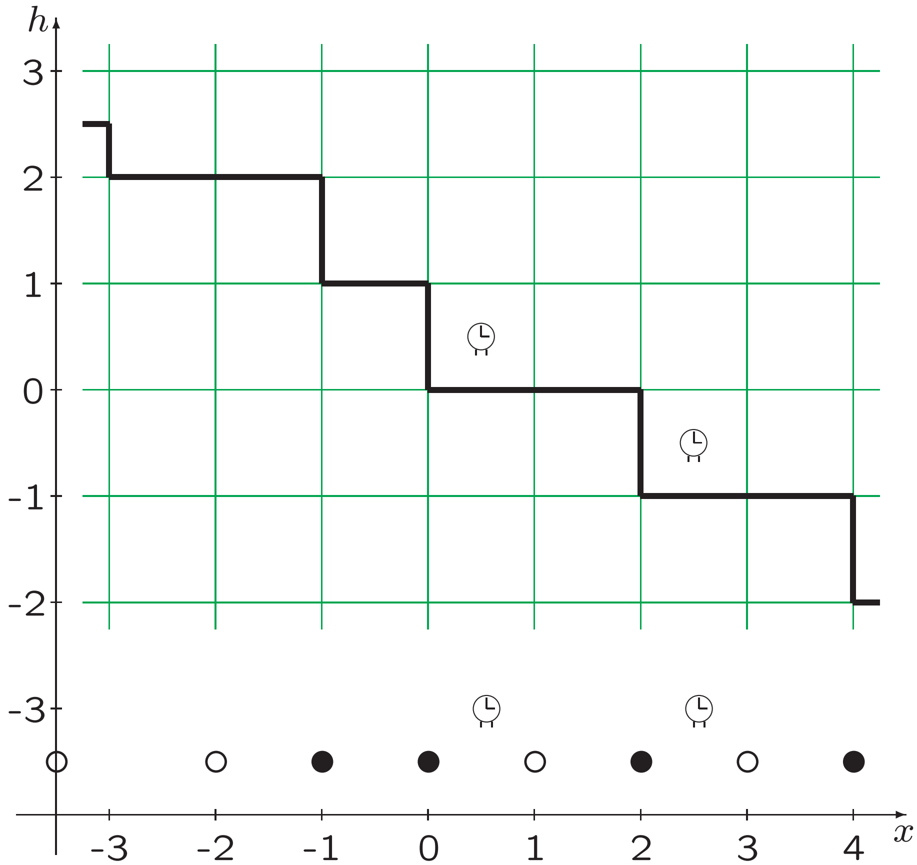

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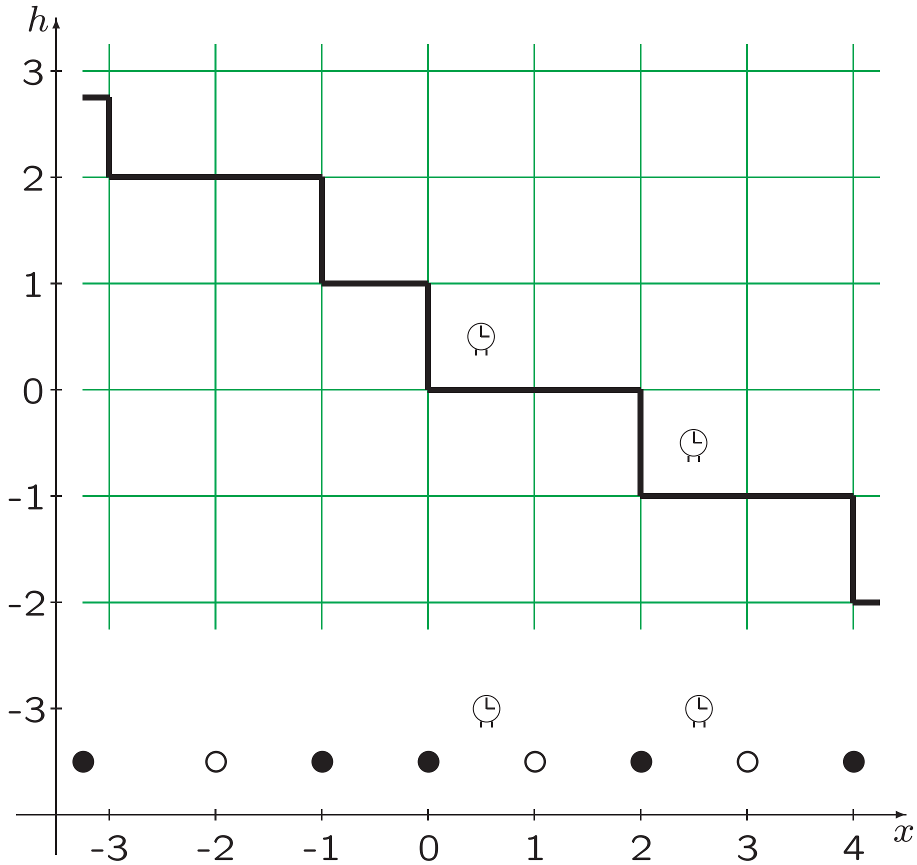

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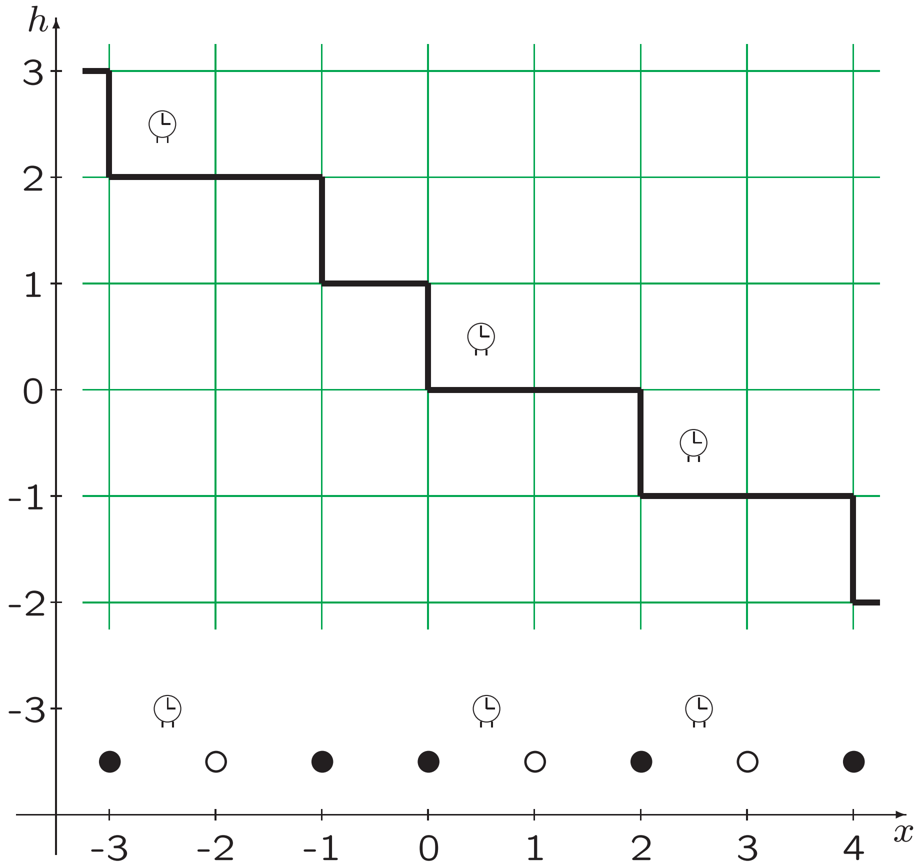

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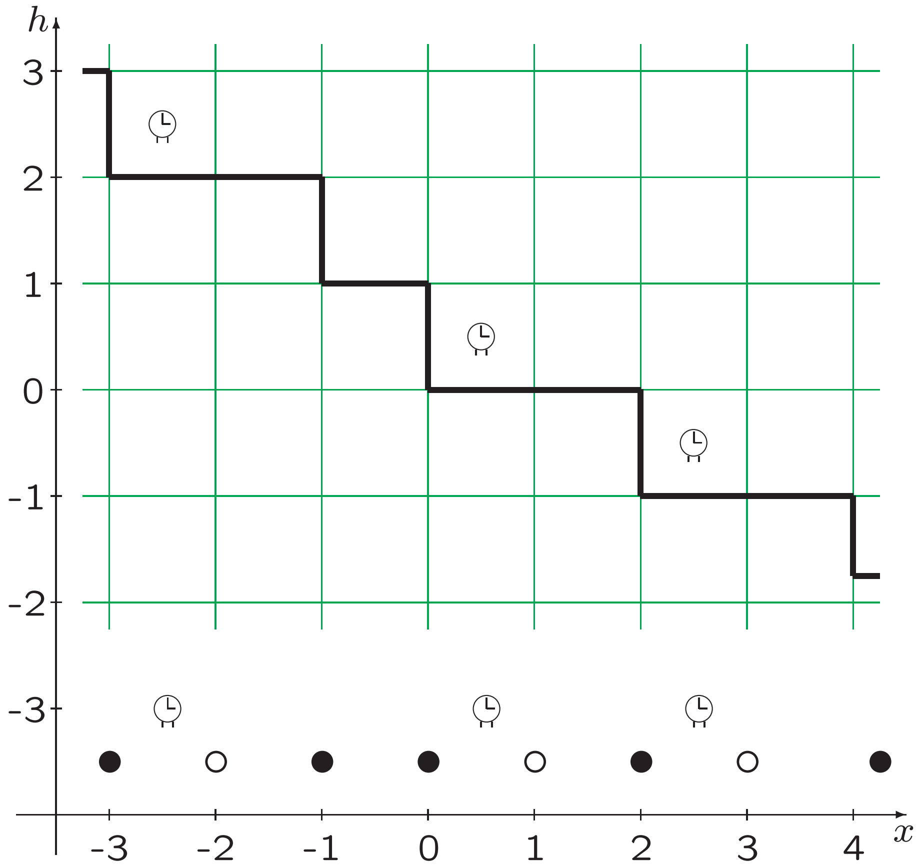

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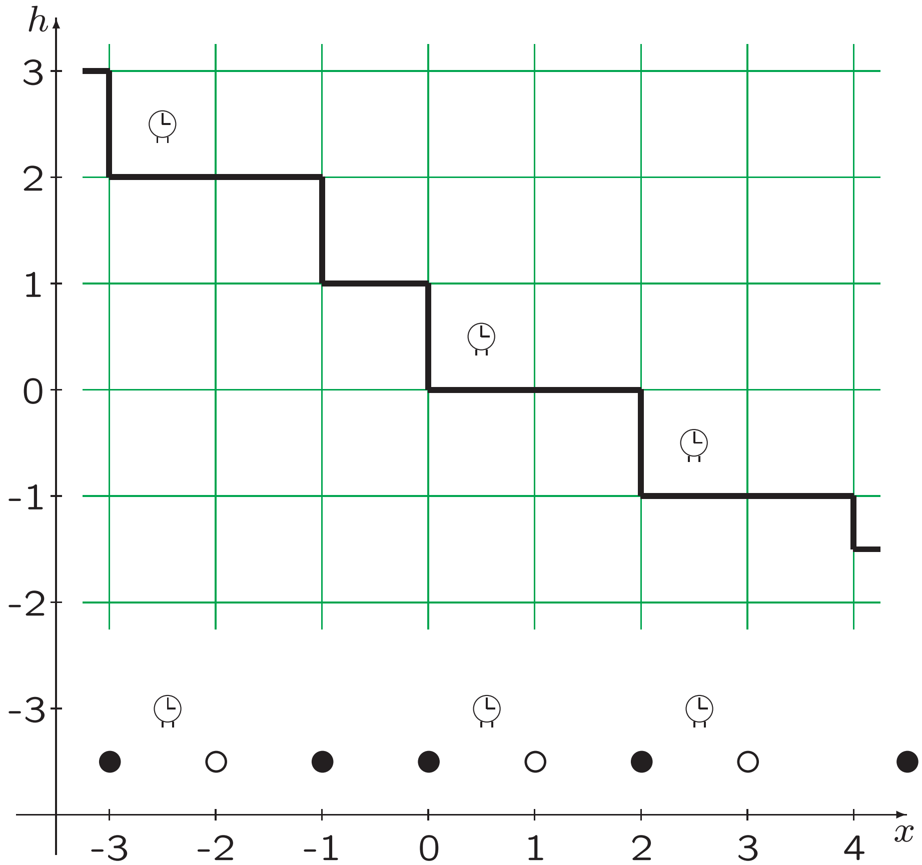

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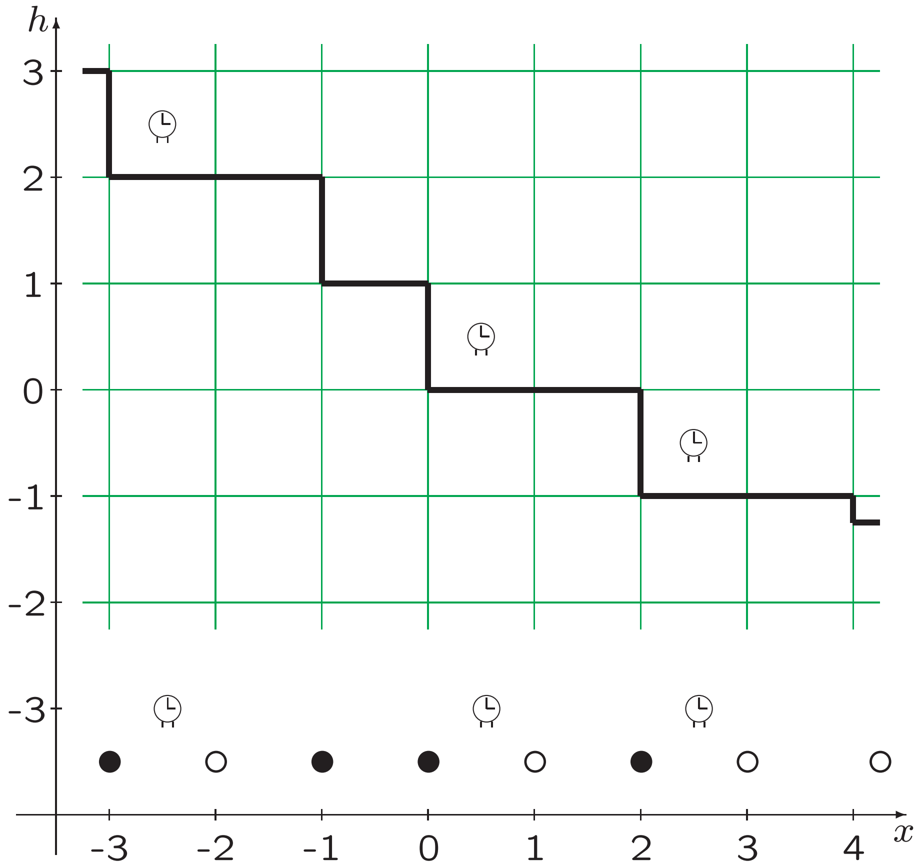

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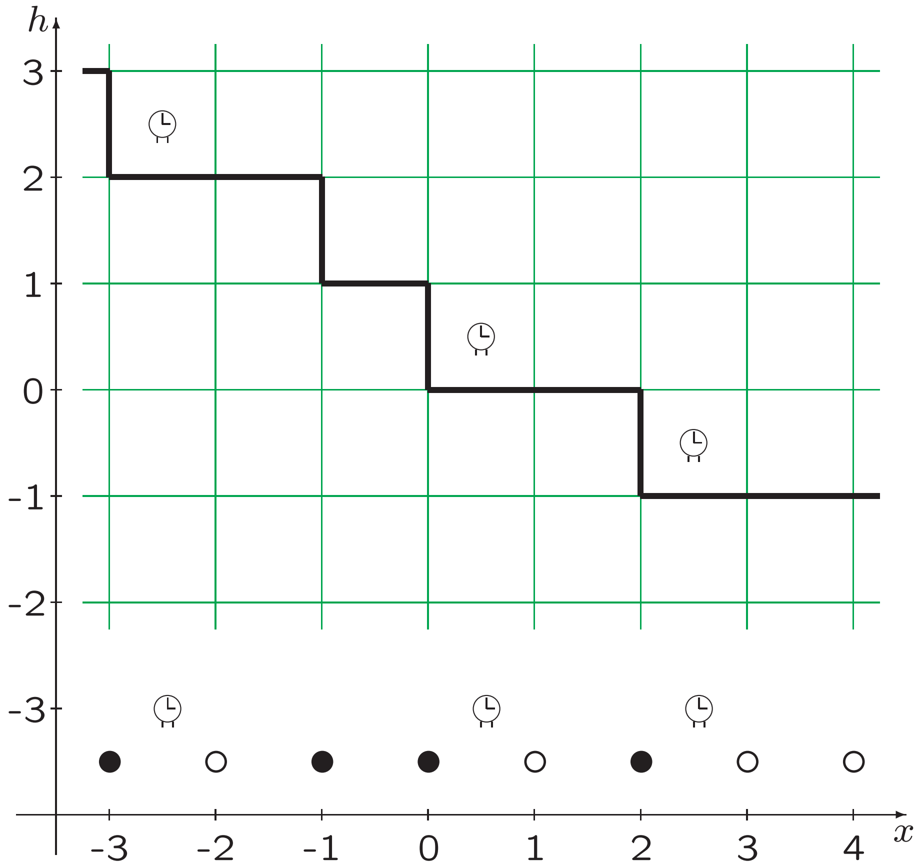

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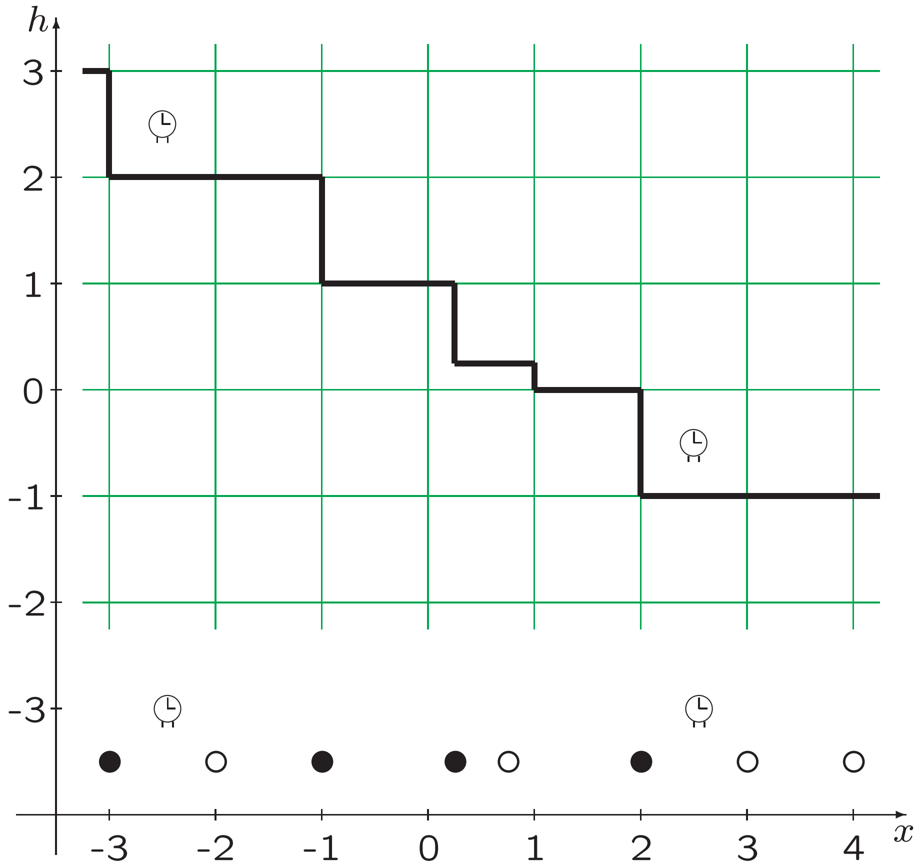

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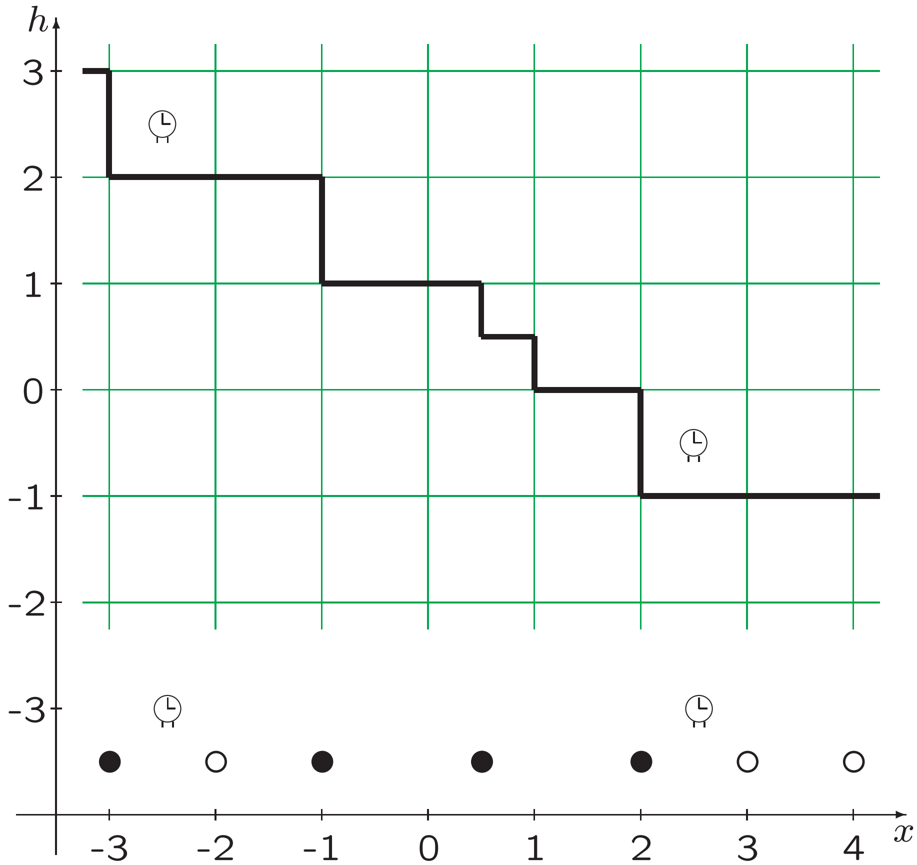

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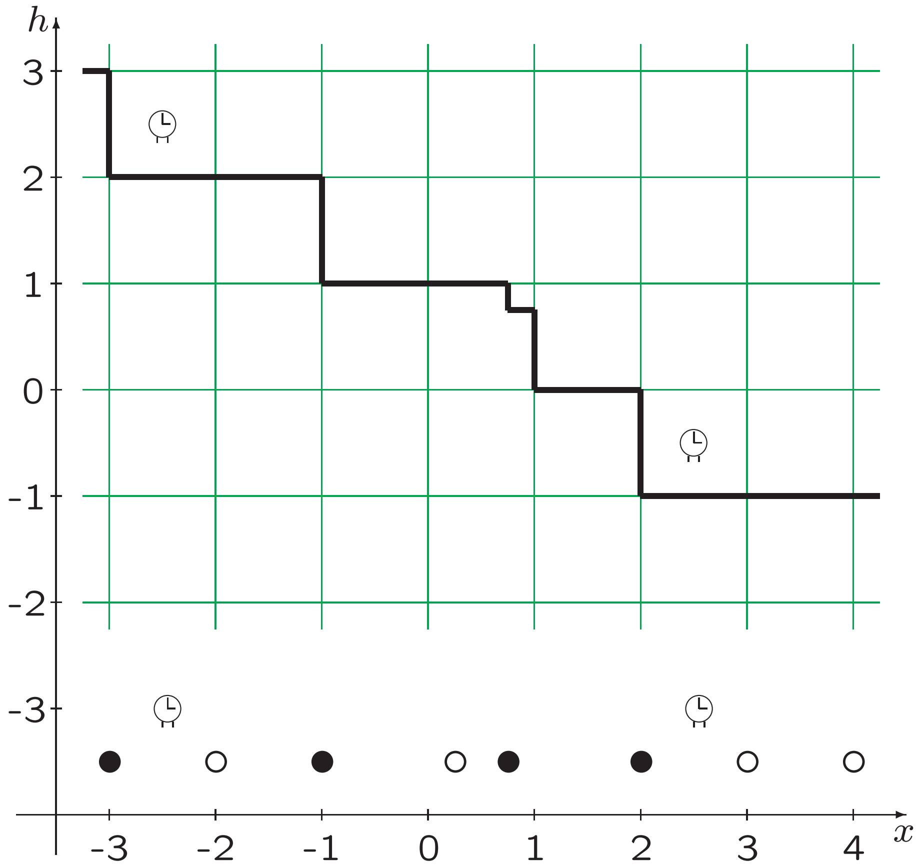

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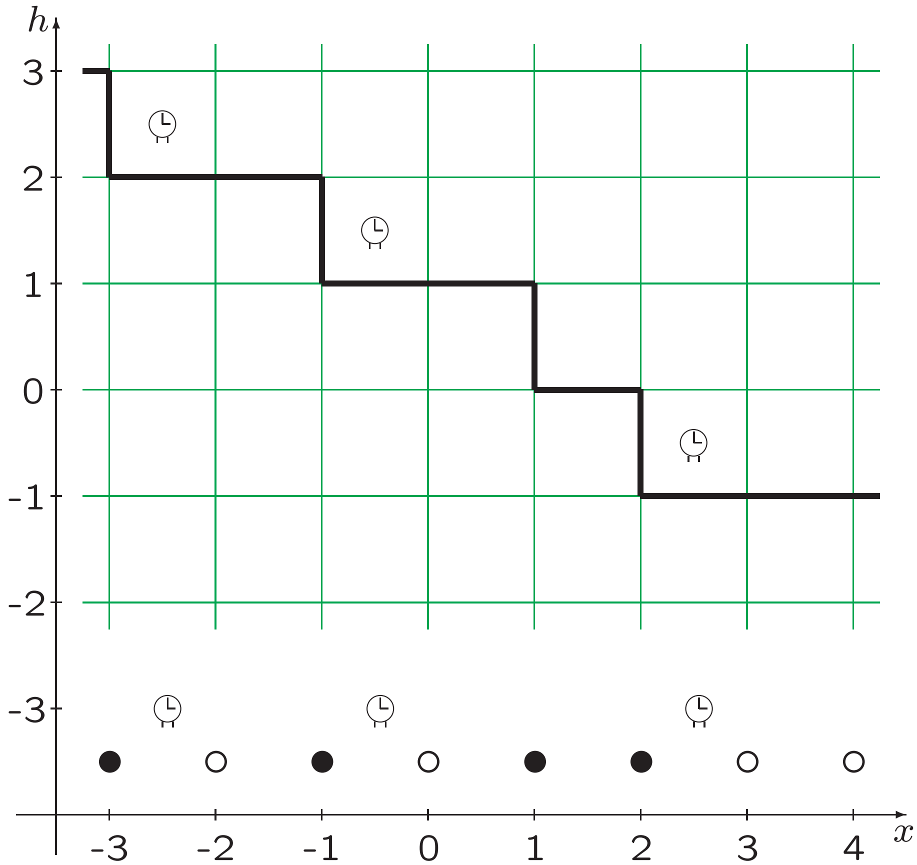
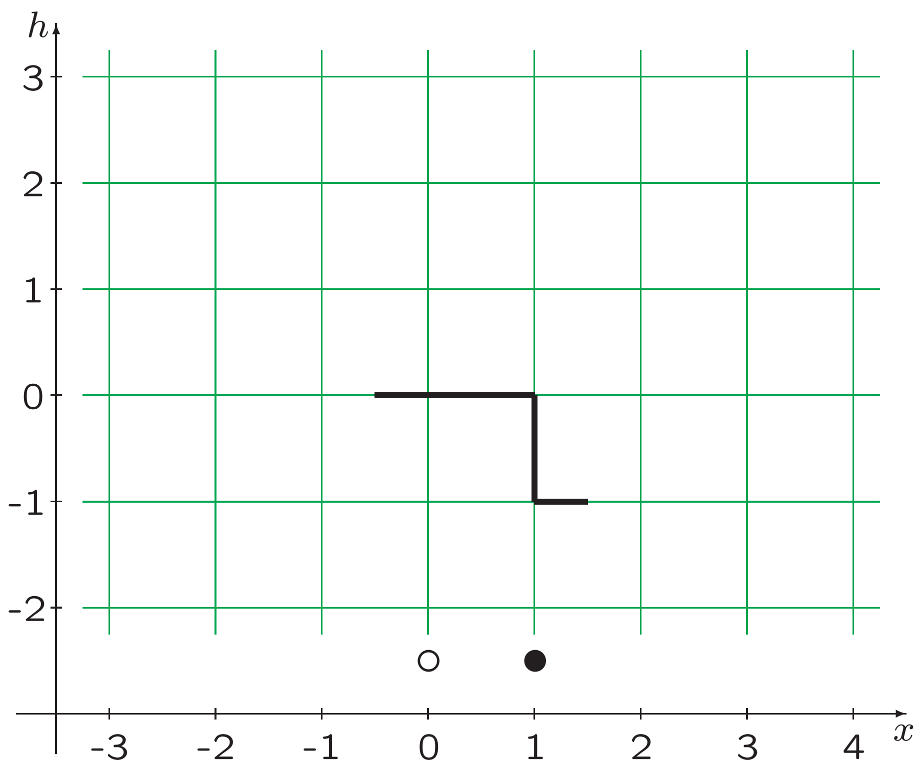


Bernoulli(ϱ) distribution

TASEP: Last passage percolation



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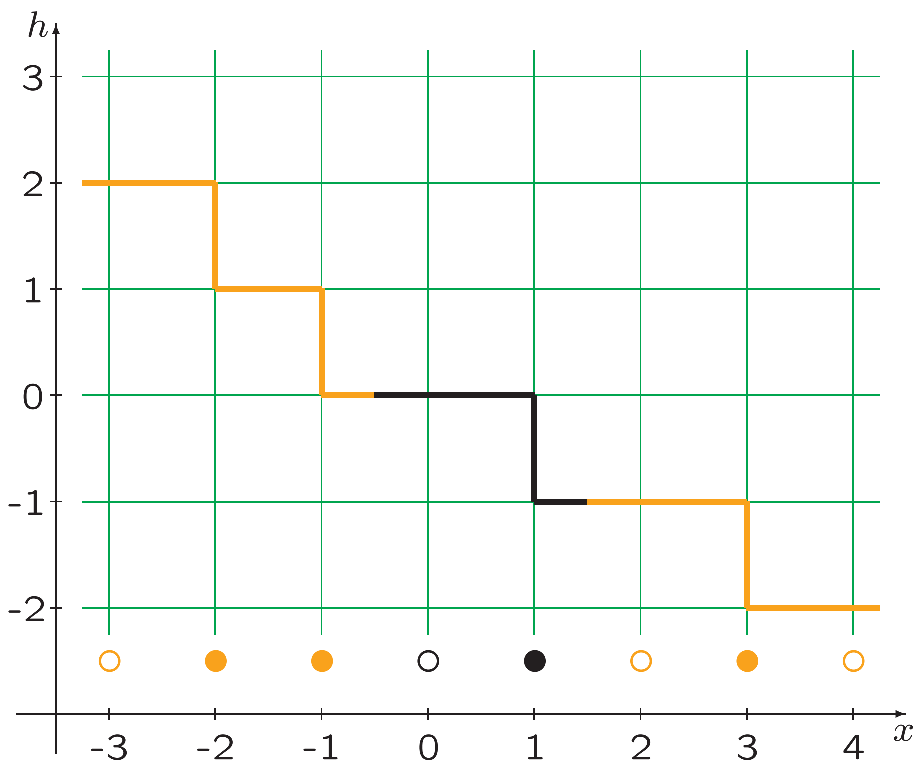

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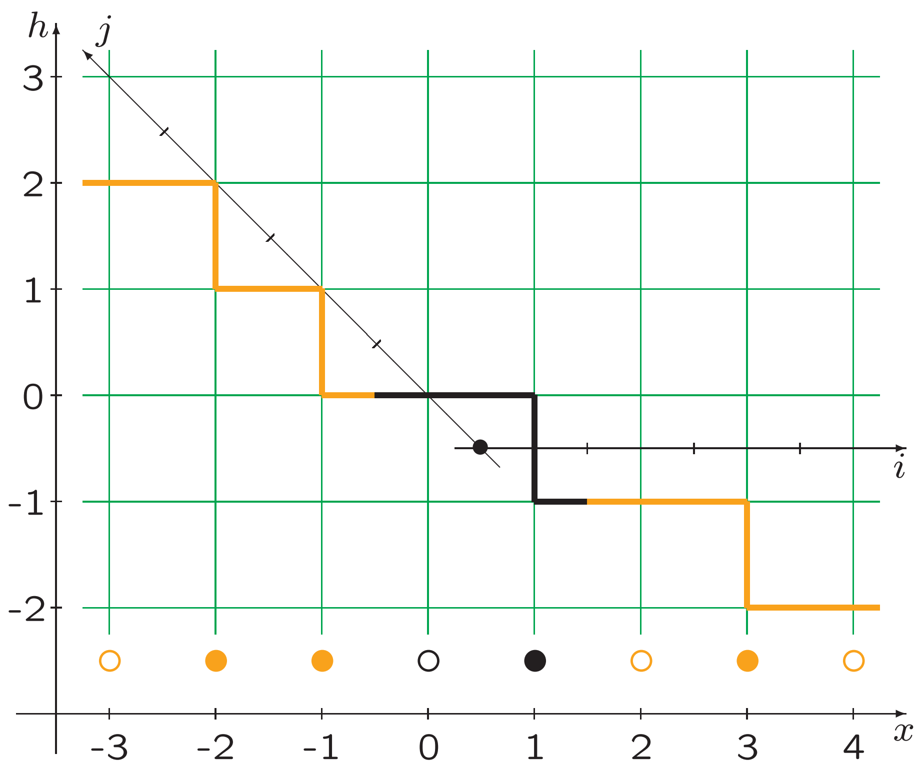

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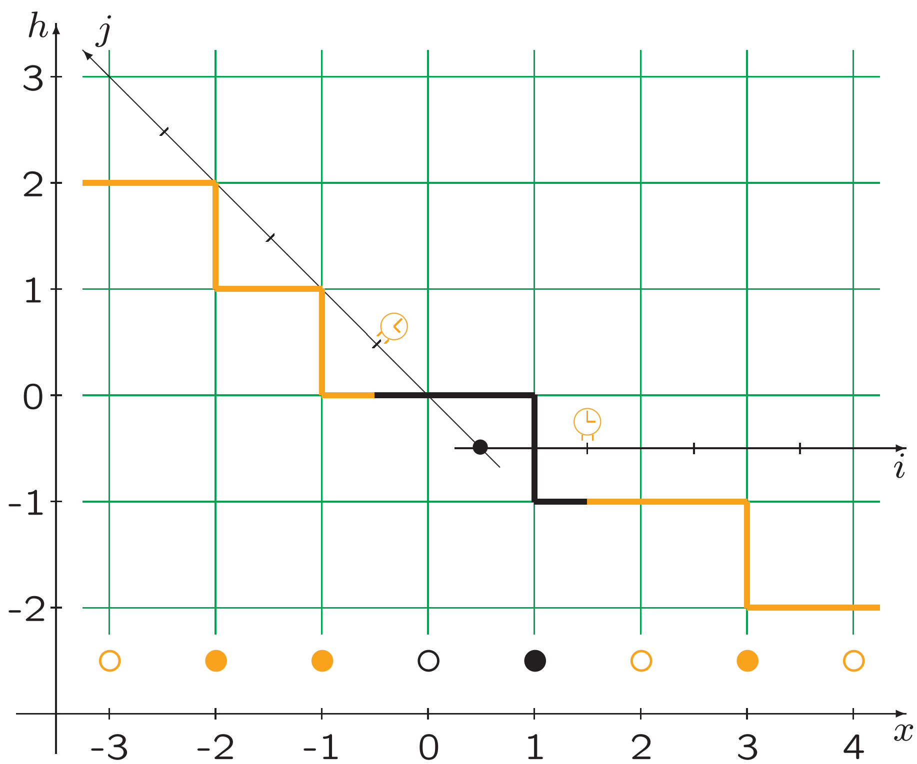

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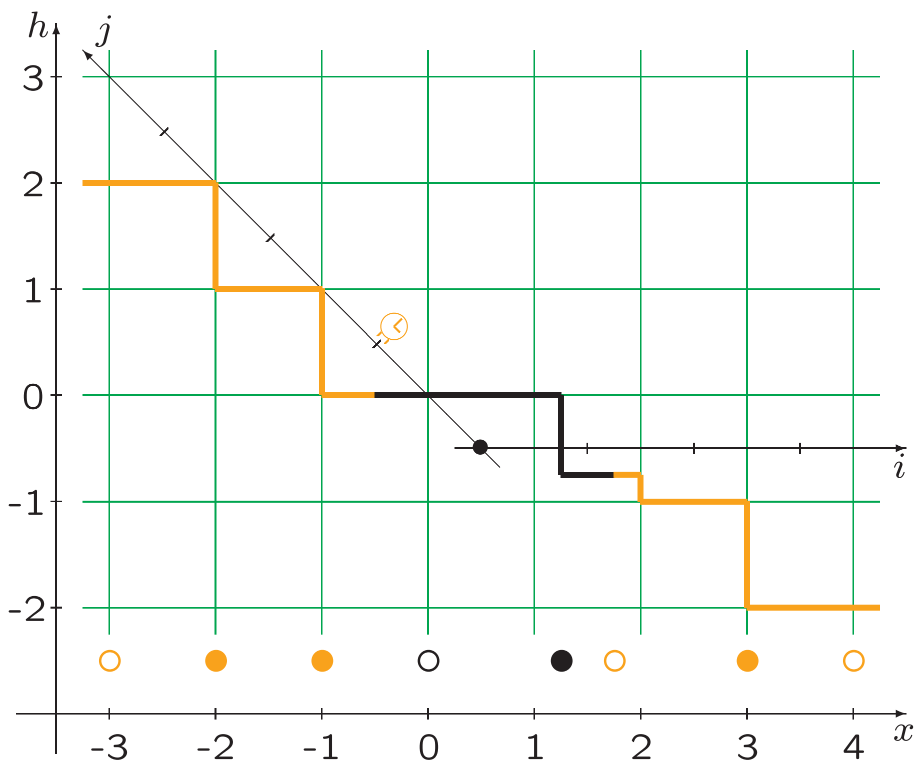

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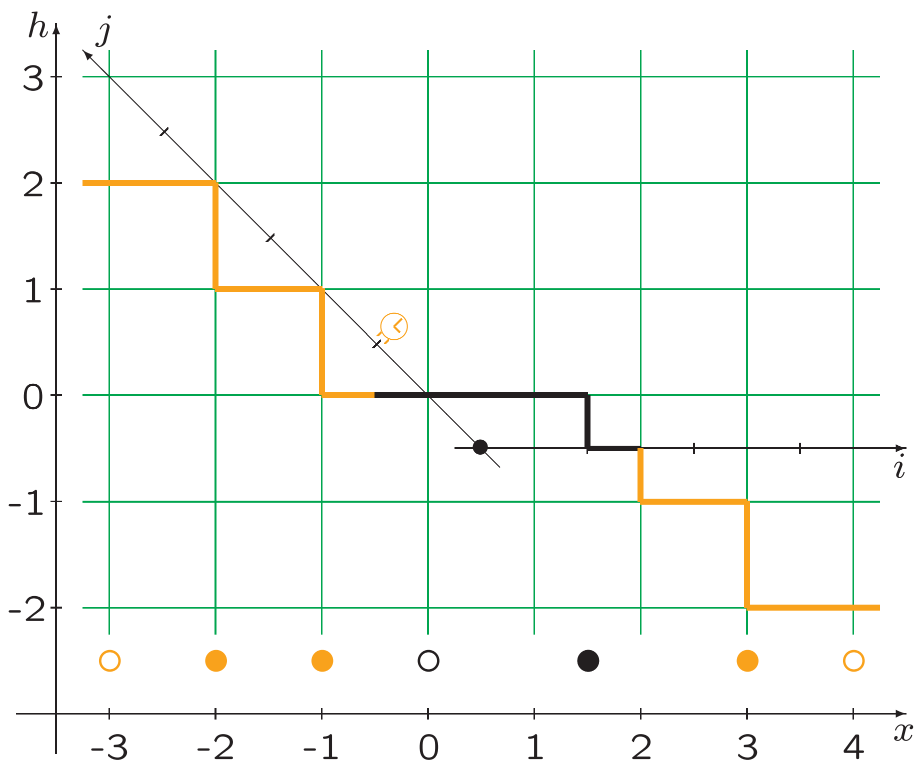

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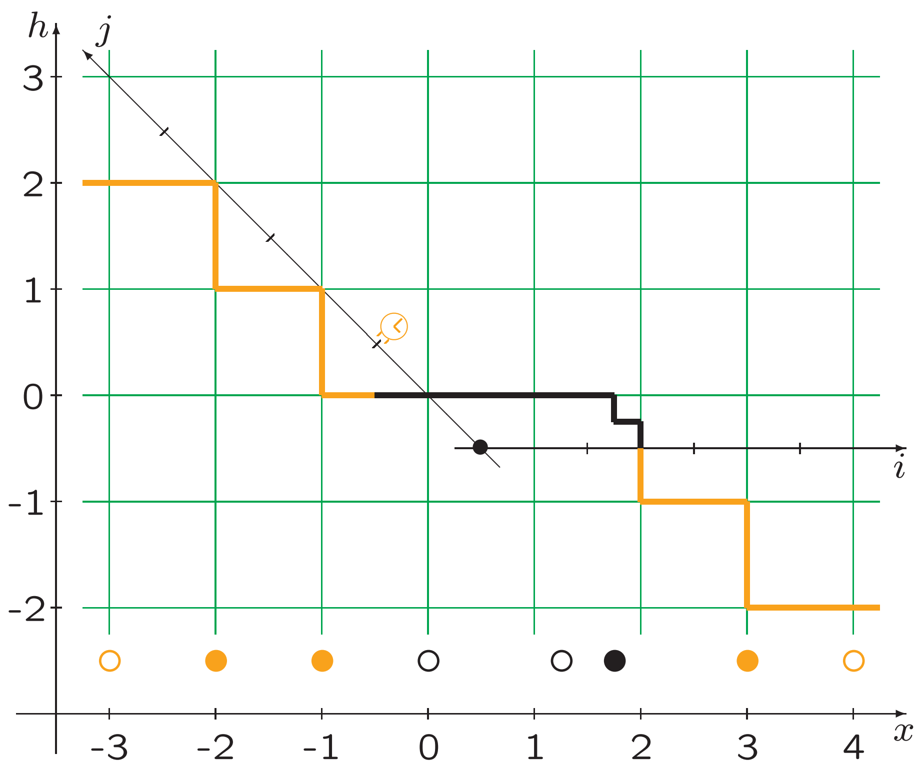

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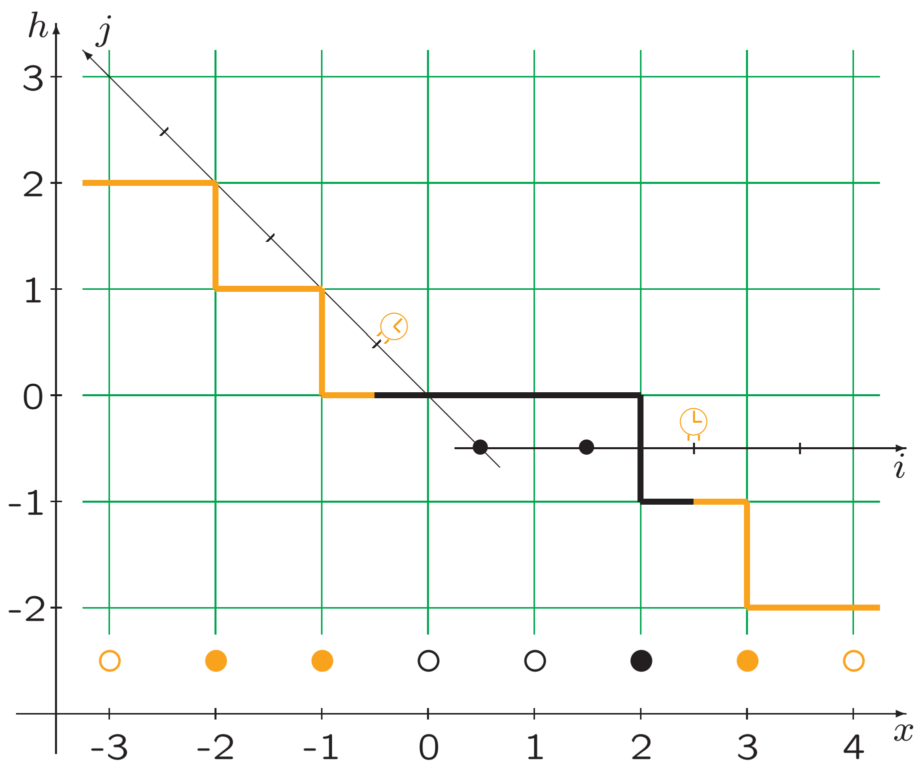

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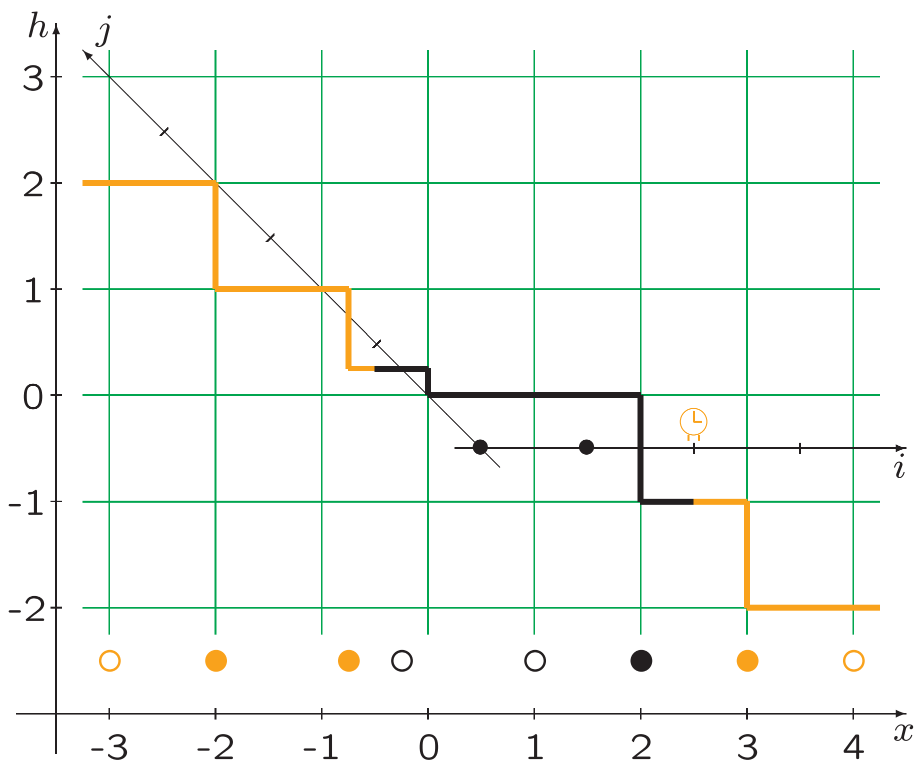

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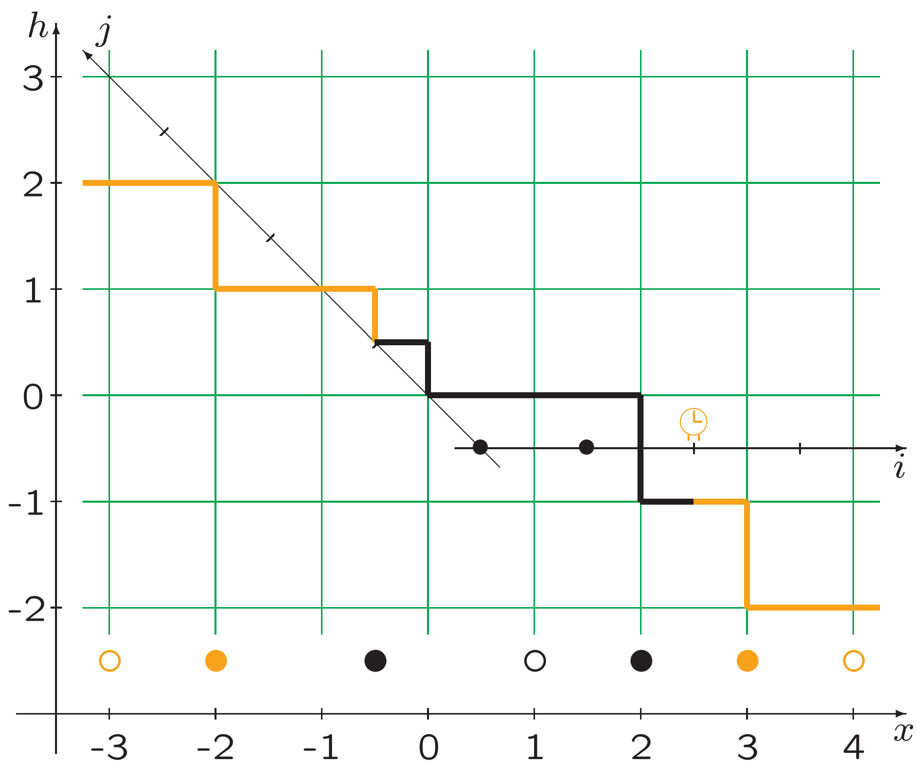

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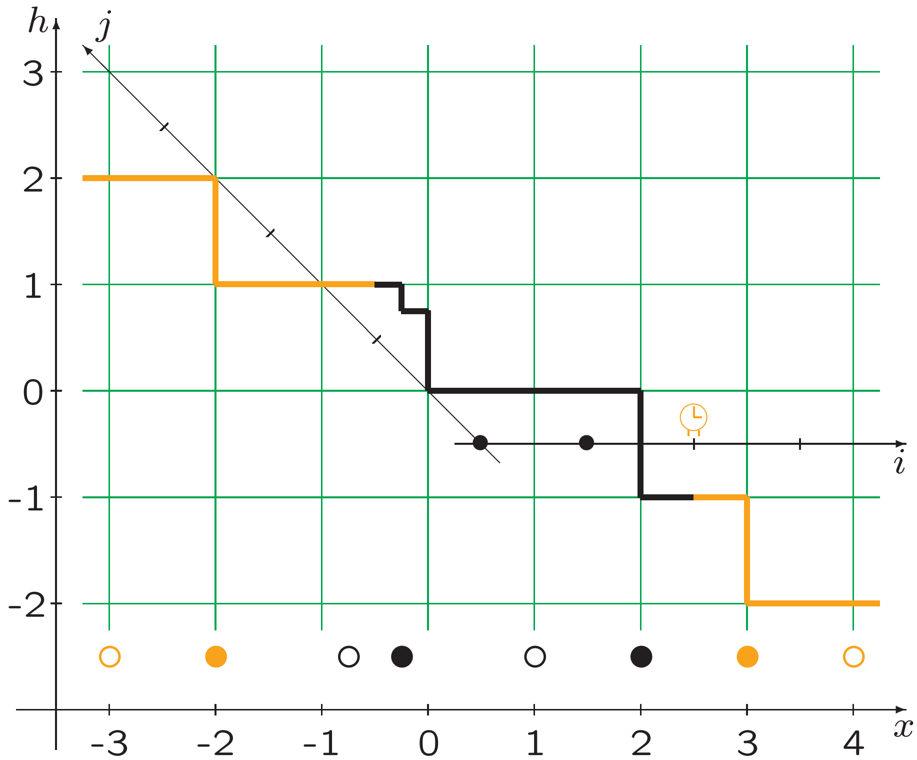

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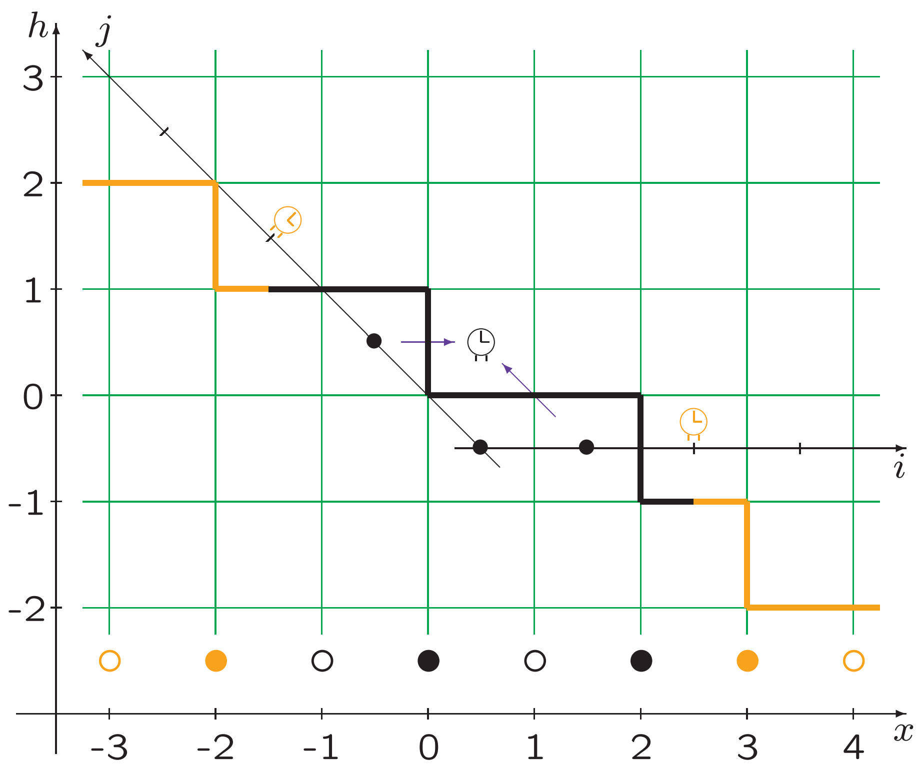
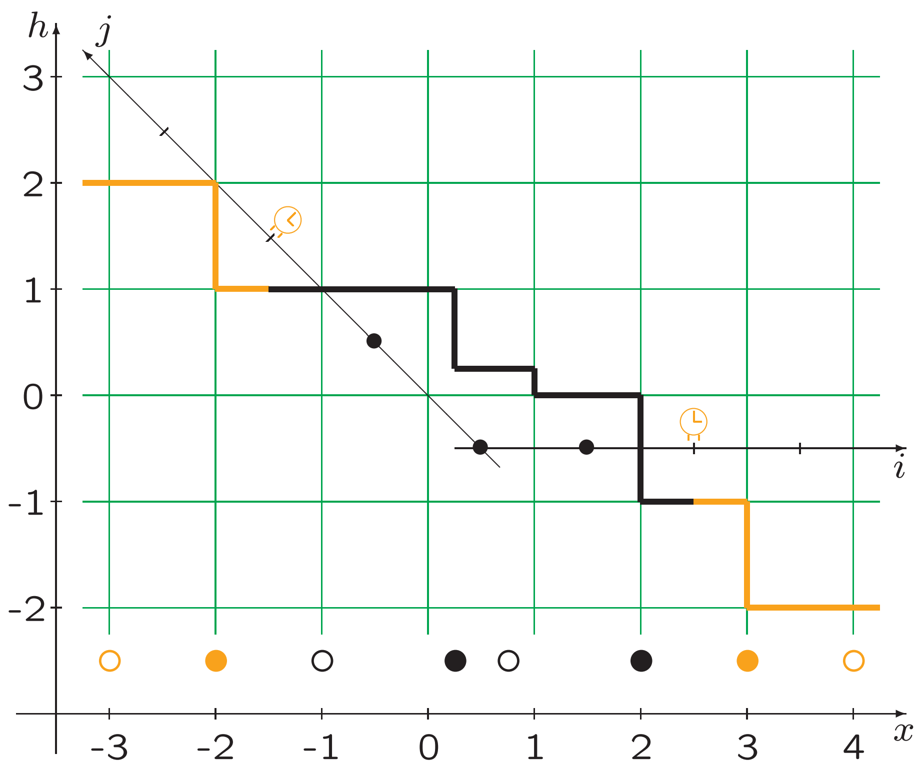
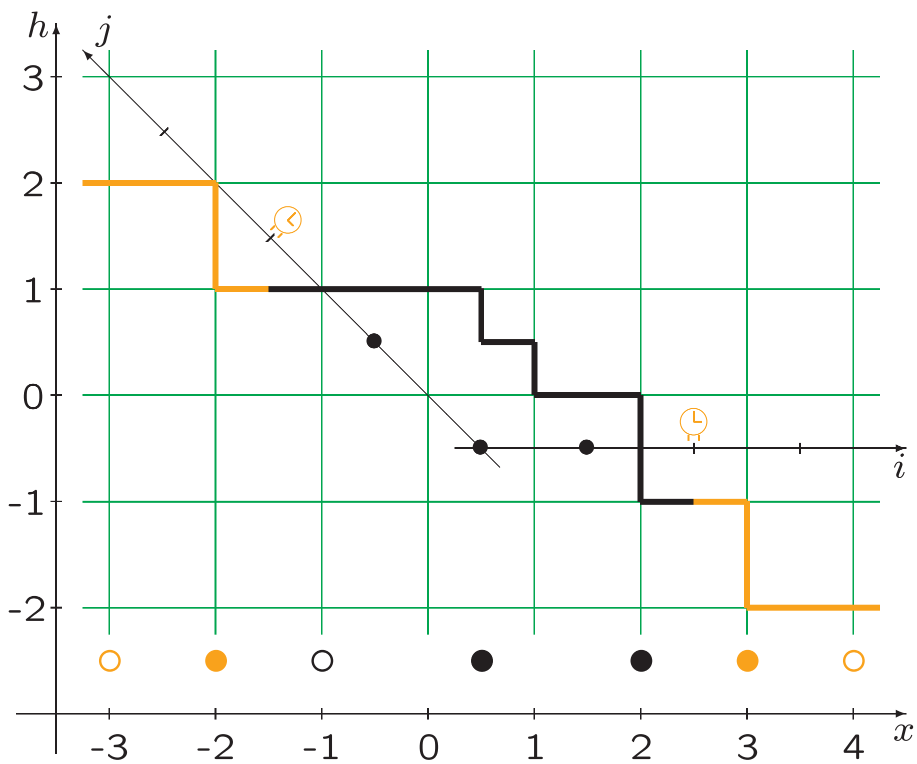


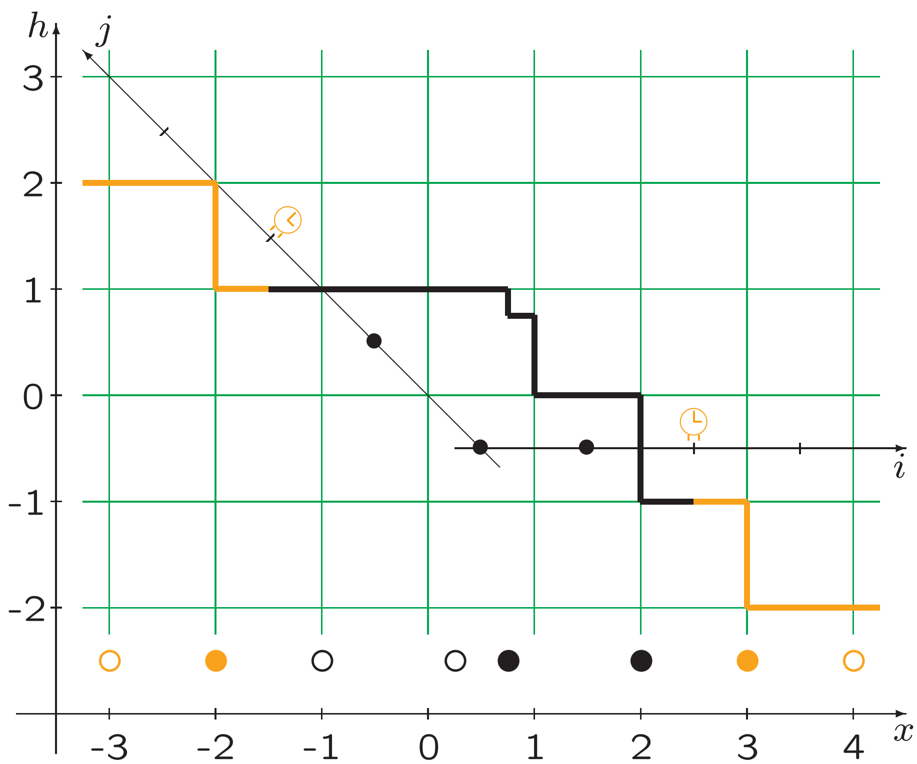
TASEP: Last passage percolation



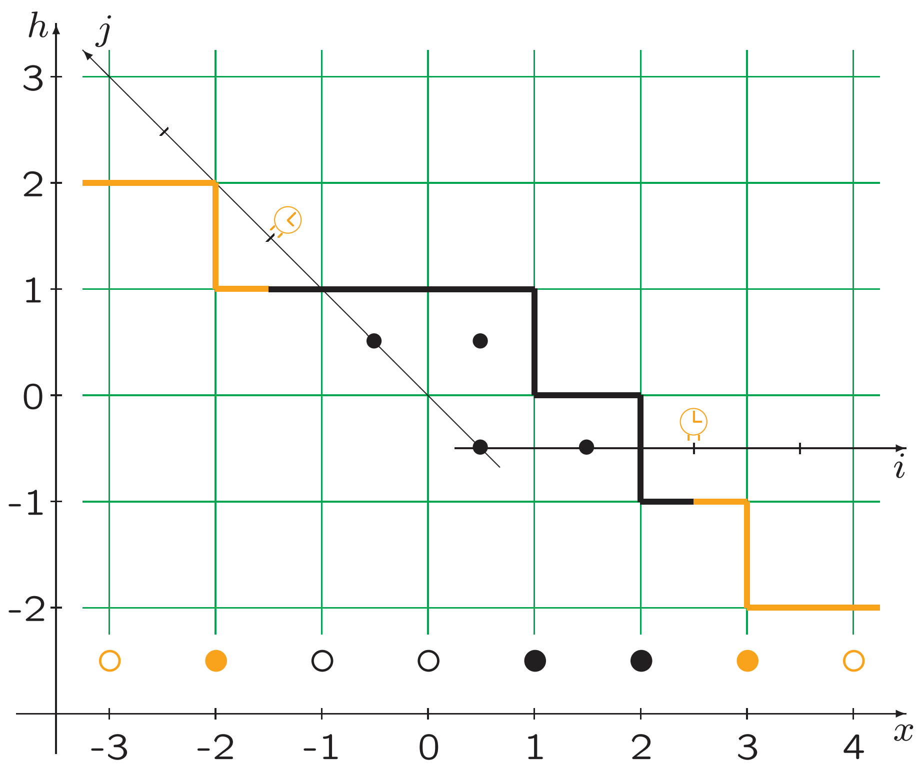
TASEP: Last passage percolation



TASEP: Last passage percolation



TASEP: Last passage percolation



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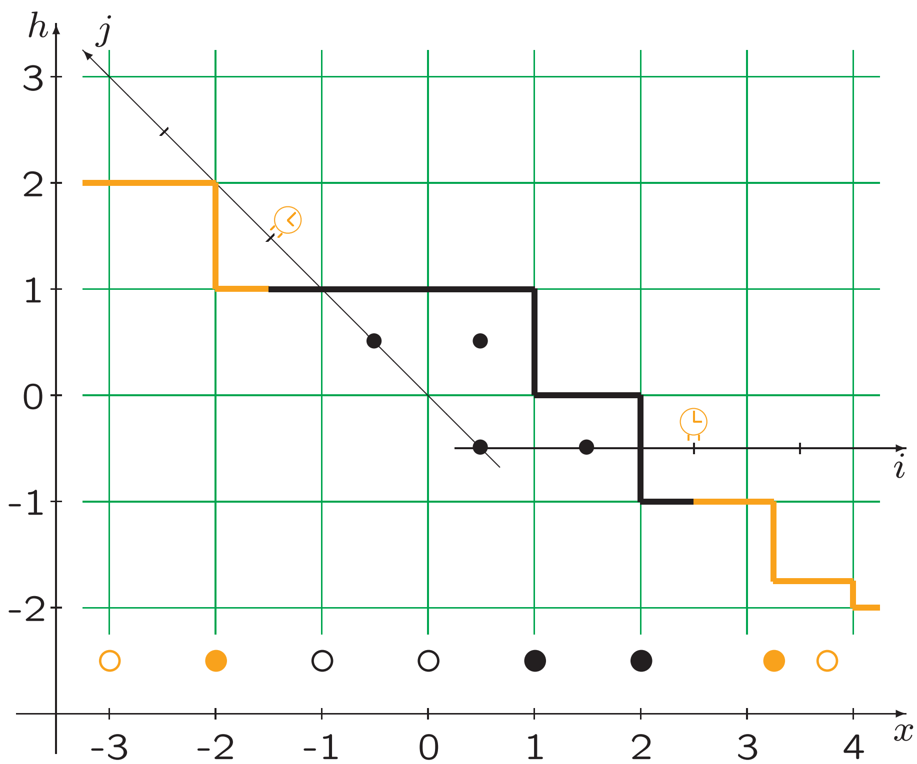

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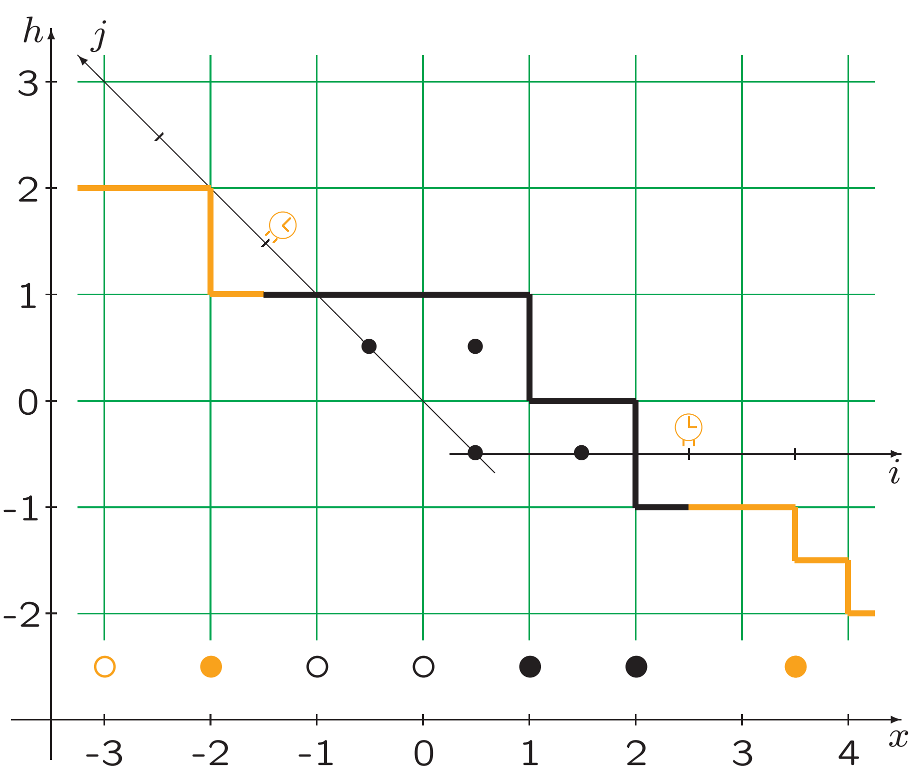

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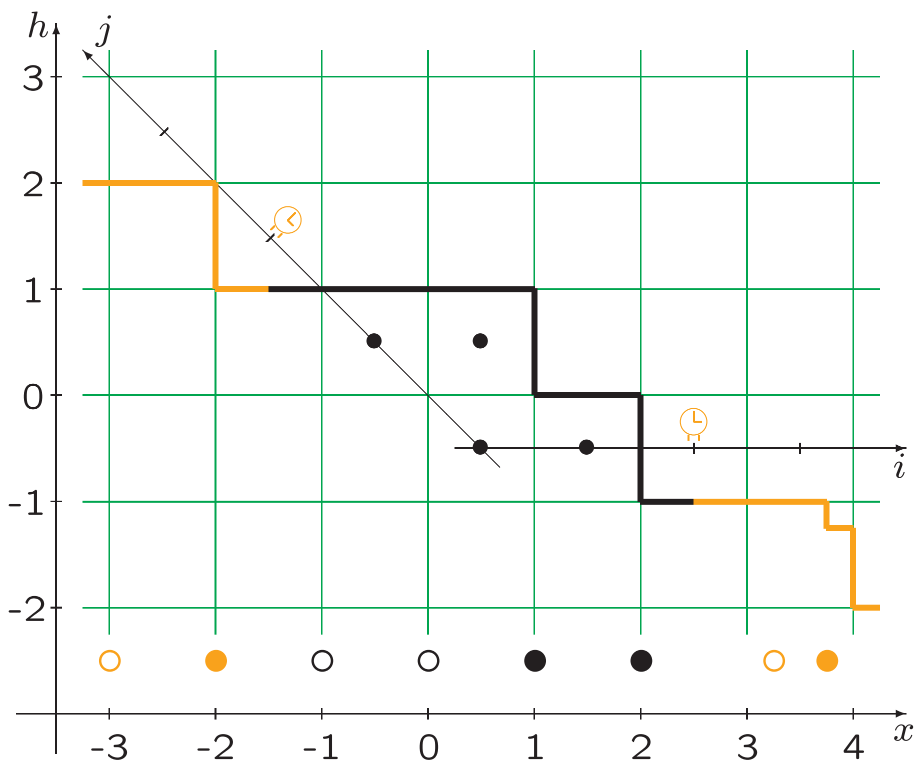

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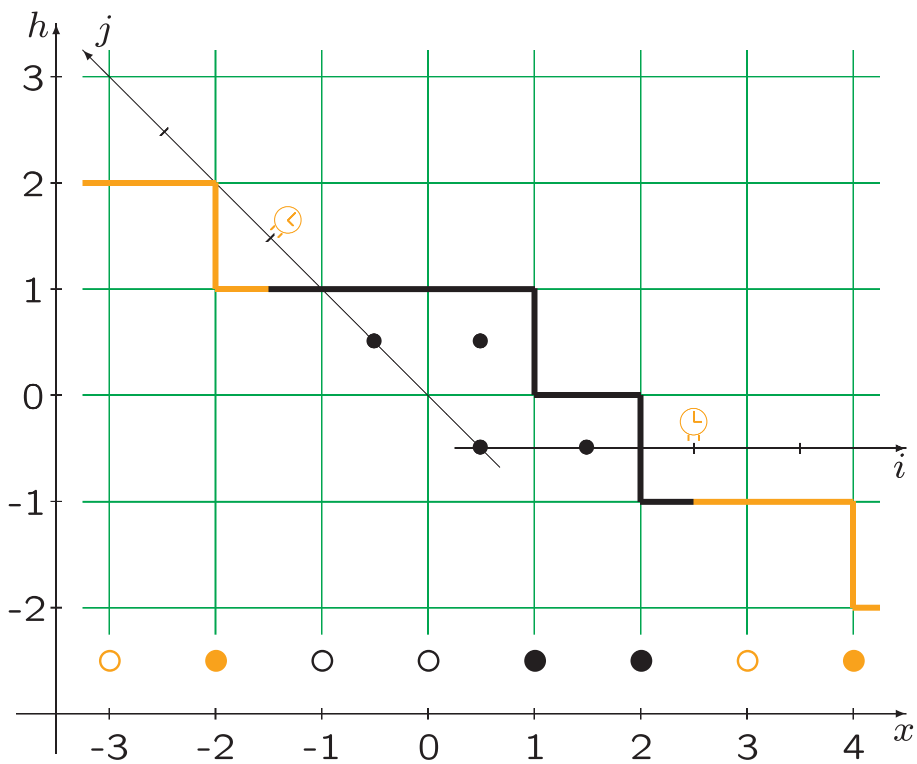

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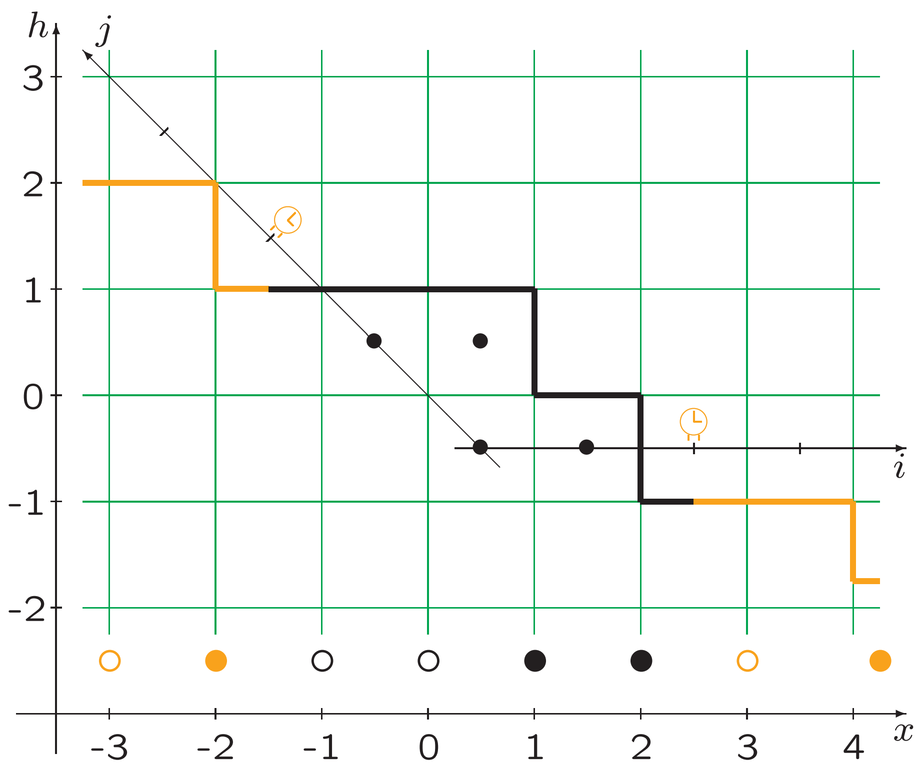

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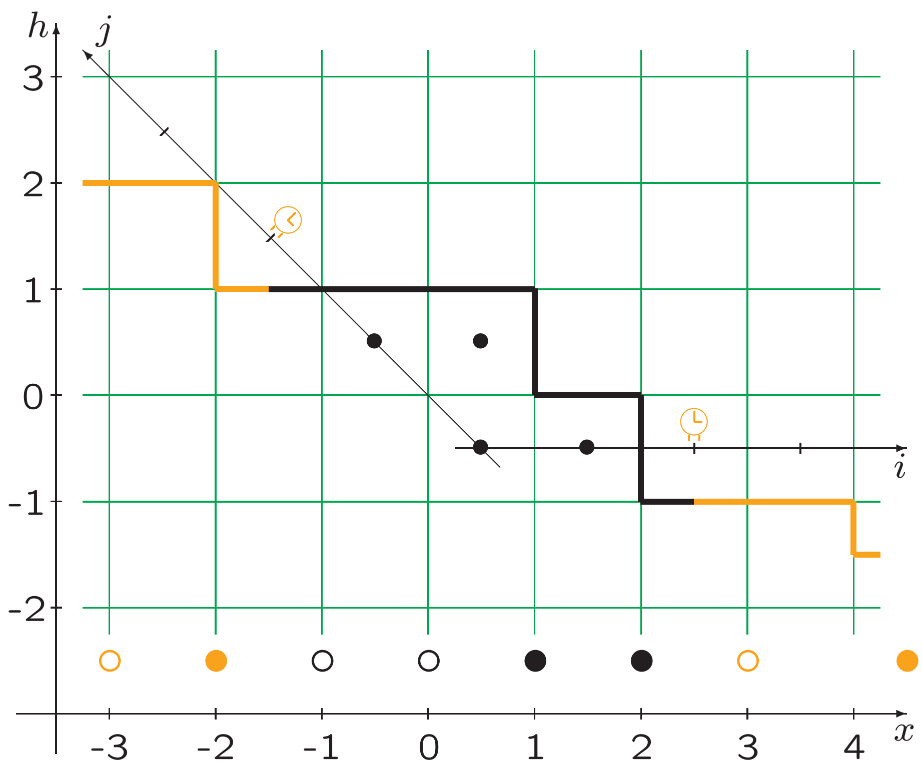

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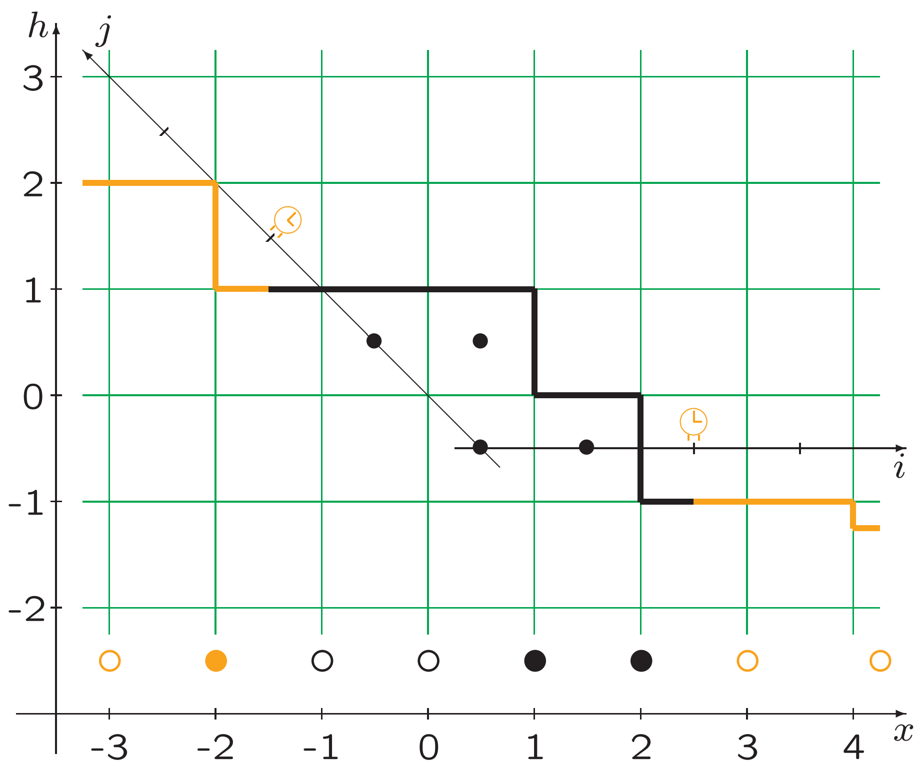
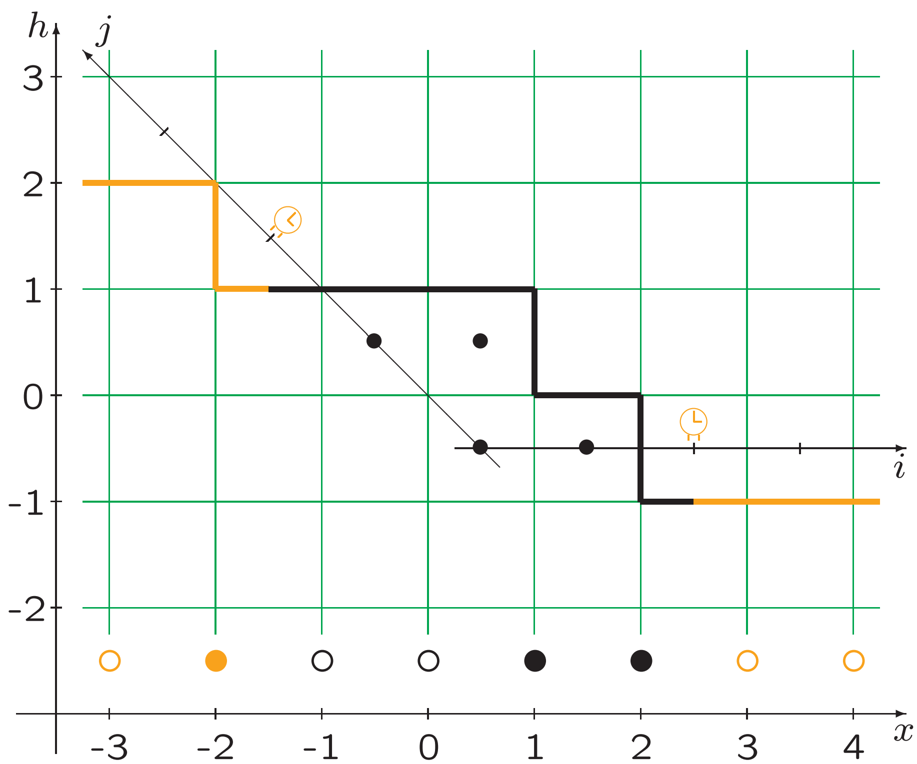
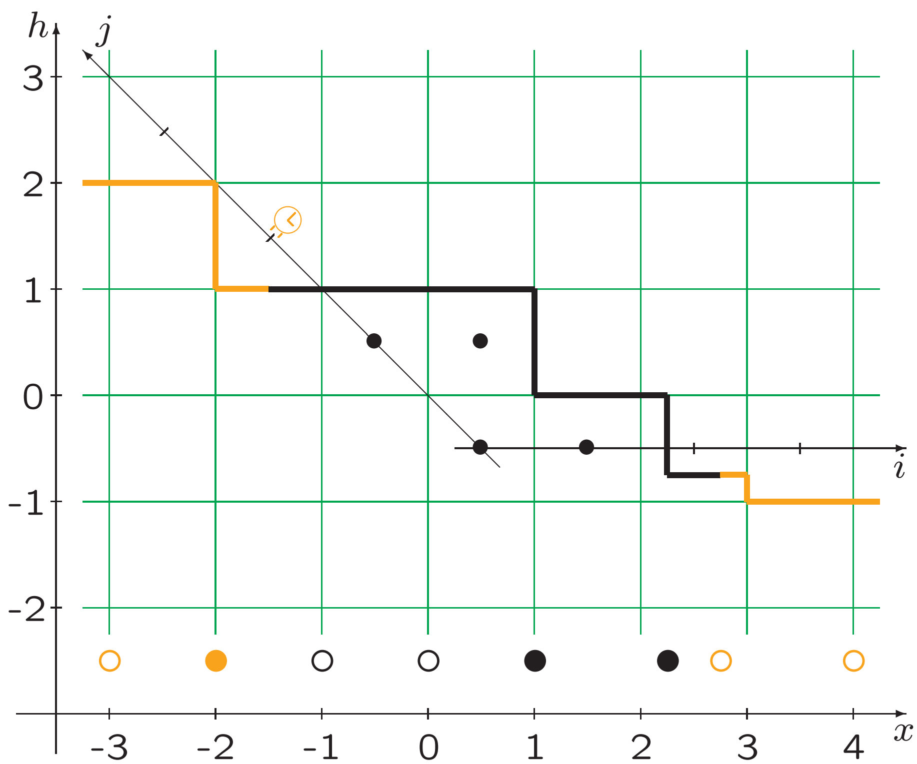


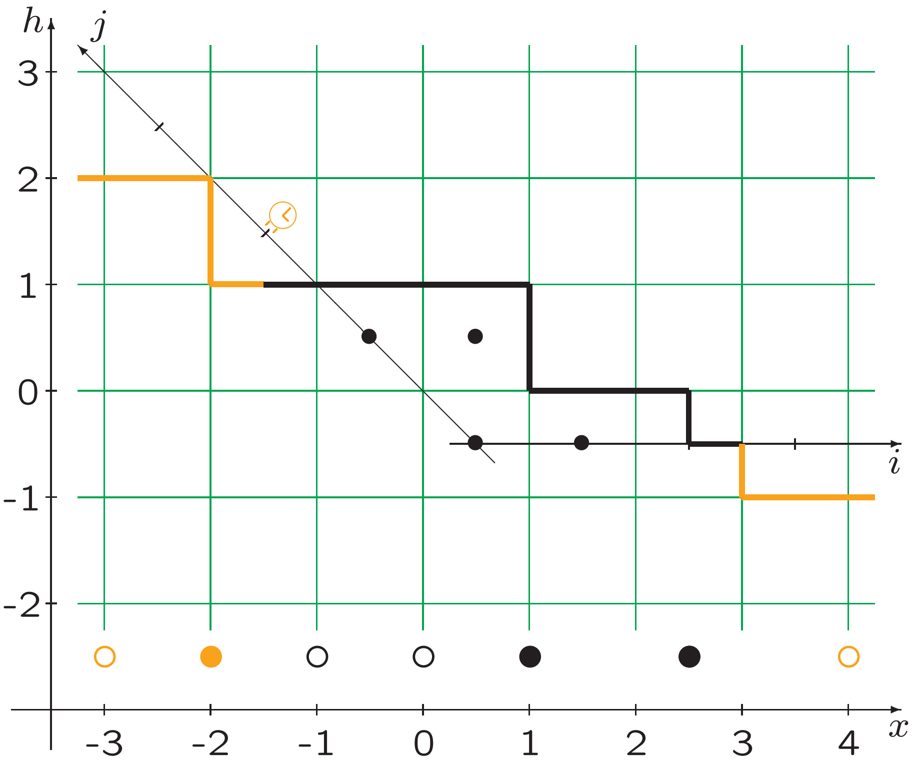
TASEP: Last passage percolation



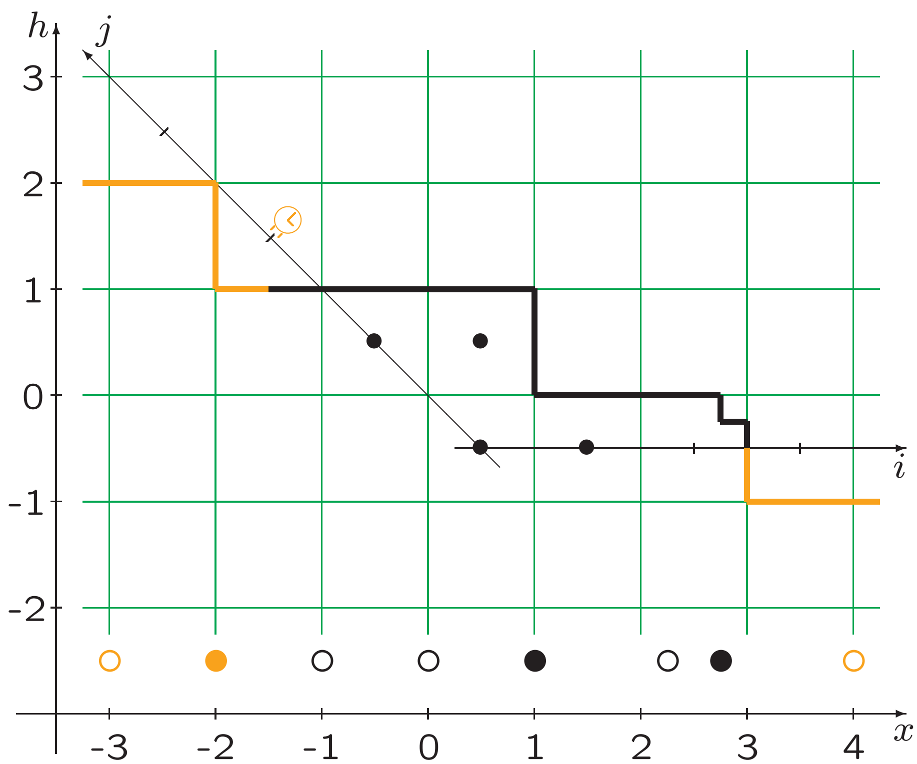
TASEP: Last passage percolation



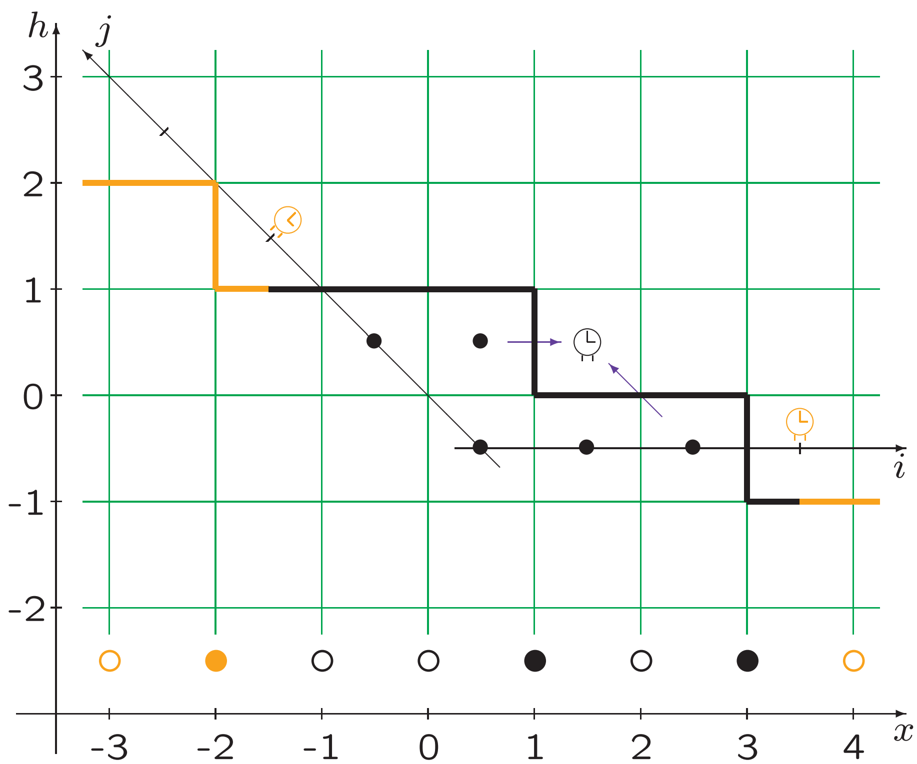
TASEP: Last passage percolation



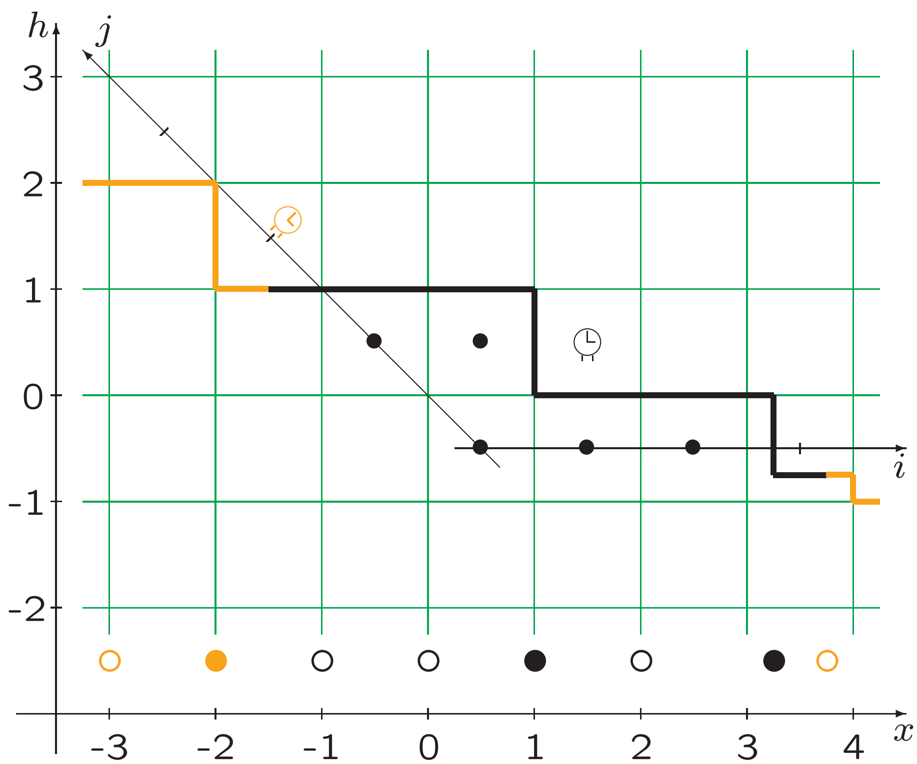
TASEP: Last passage percolation



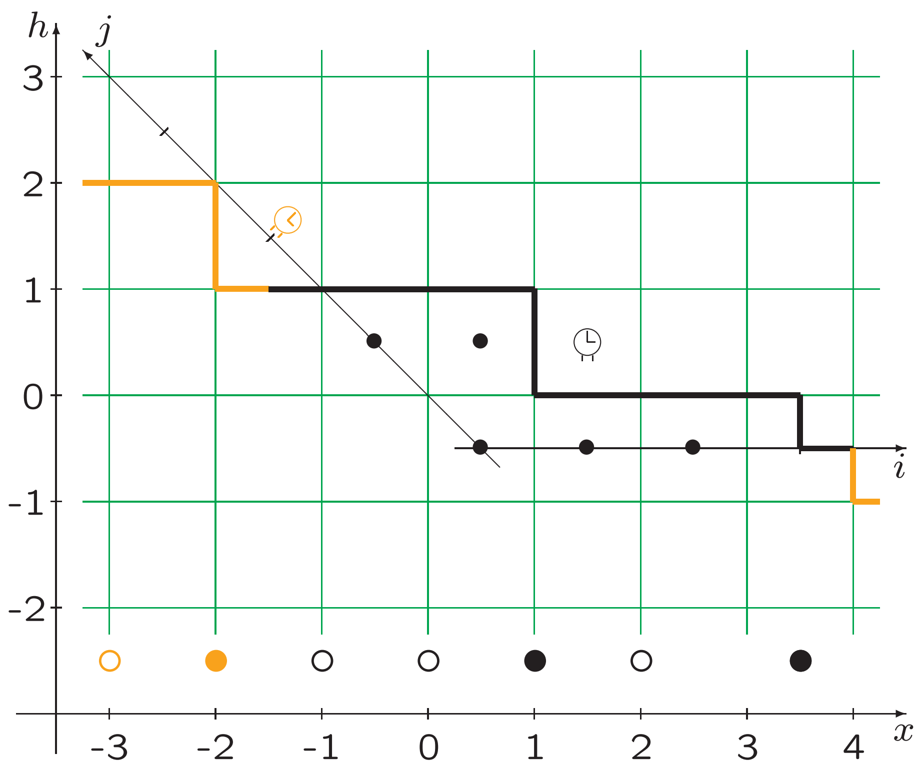
TASEP: Last passage percolation



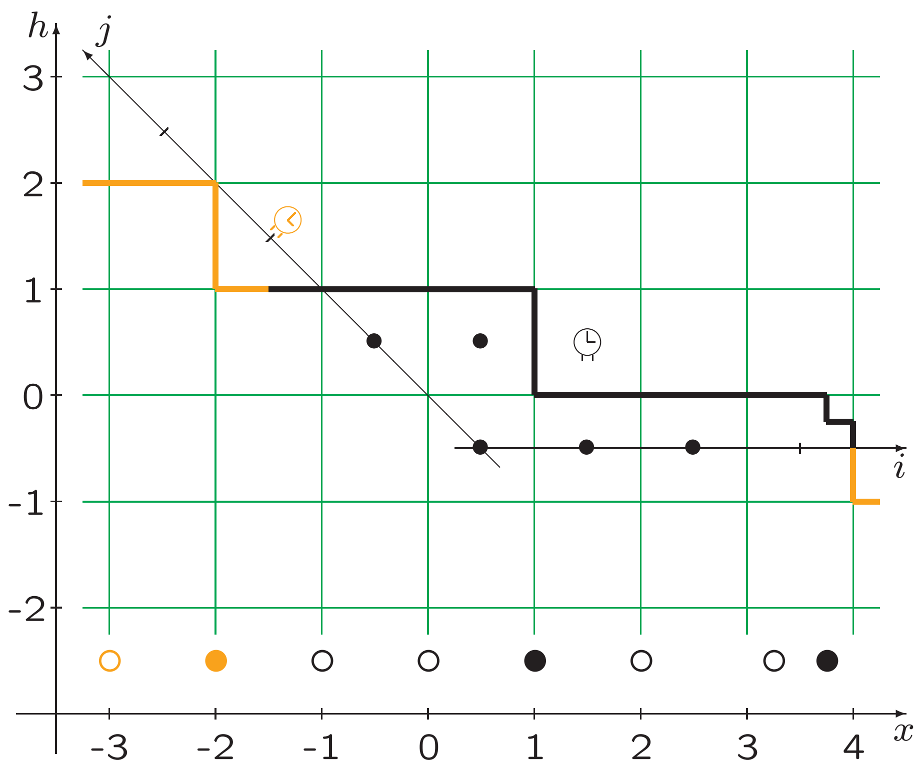
TASEP: Last passage percolation



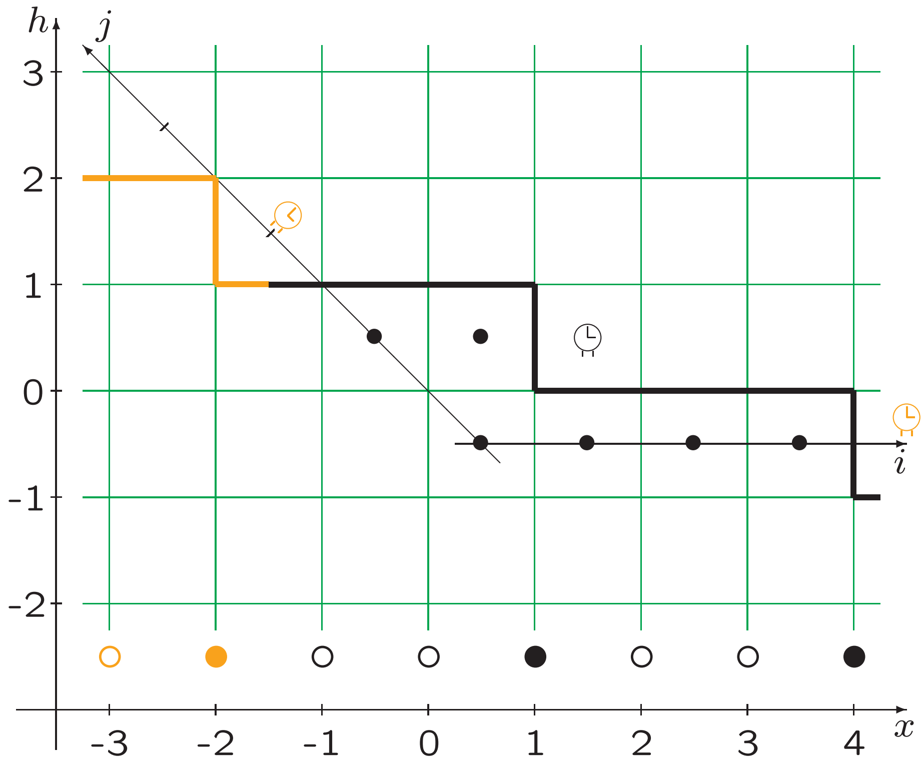
TASEP: Last passage percolation



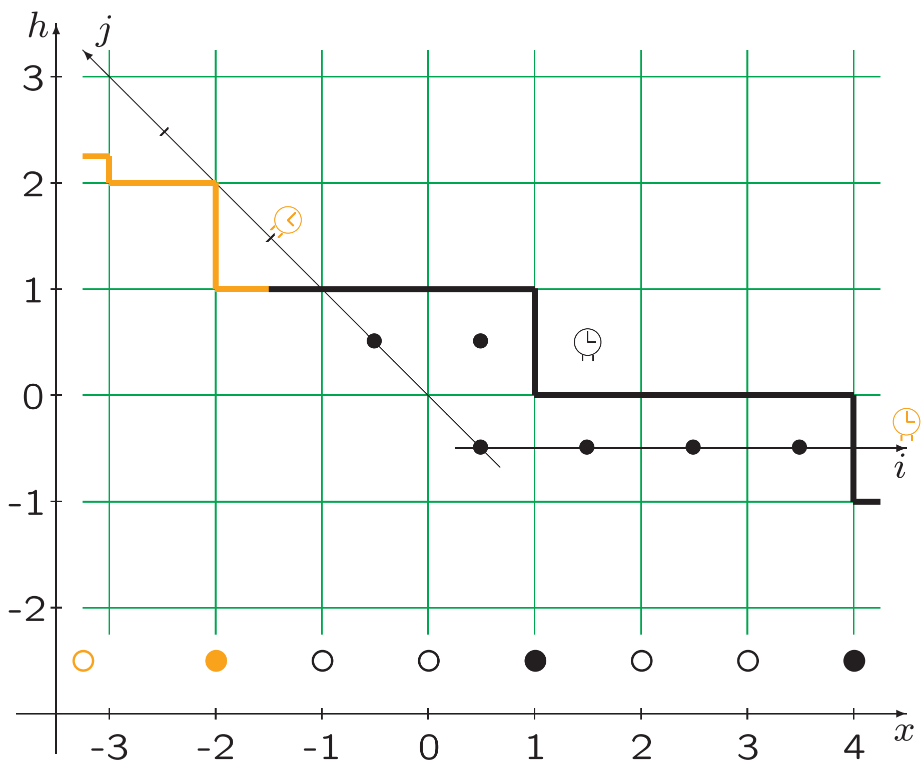
TASEP: Last passage percolation



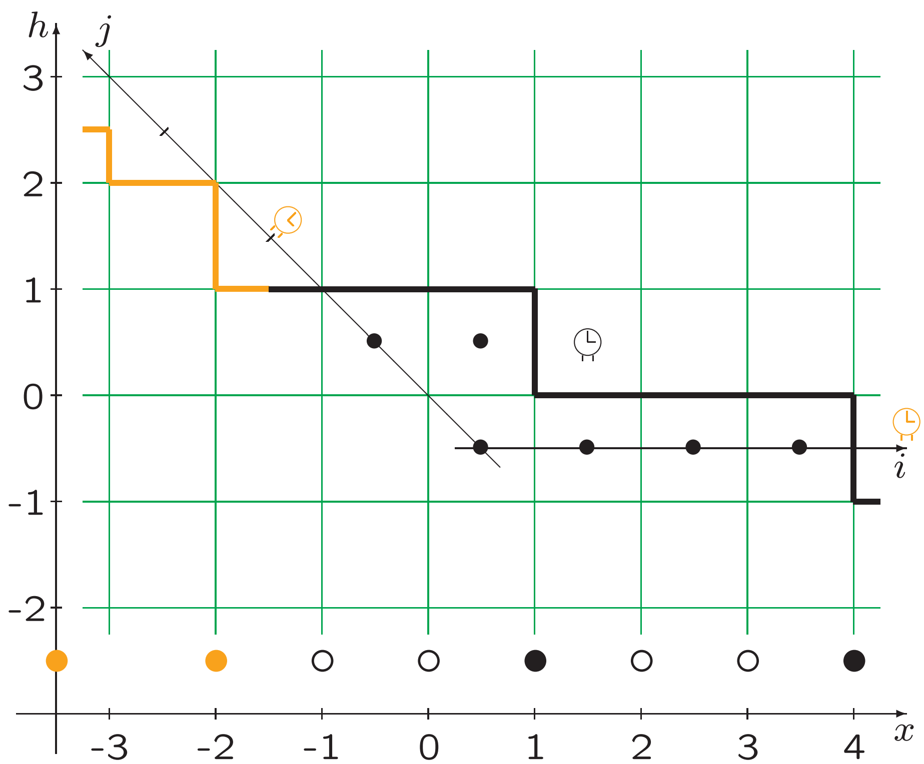
TASEP: Last passage percolation



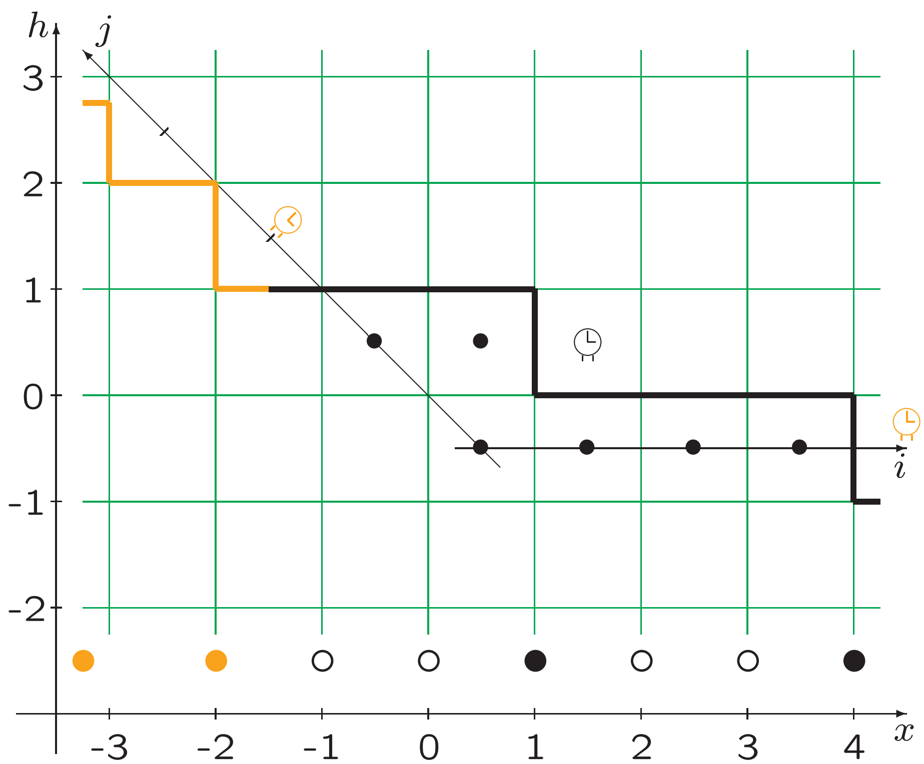
TASEP: Last passage percolation



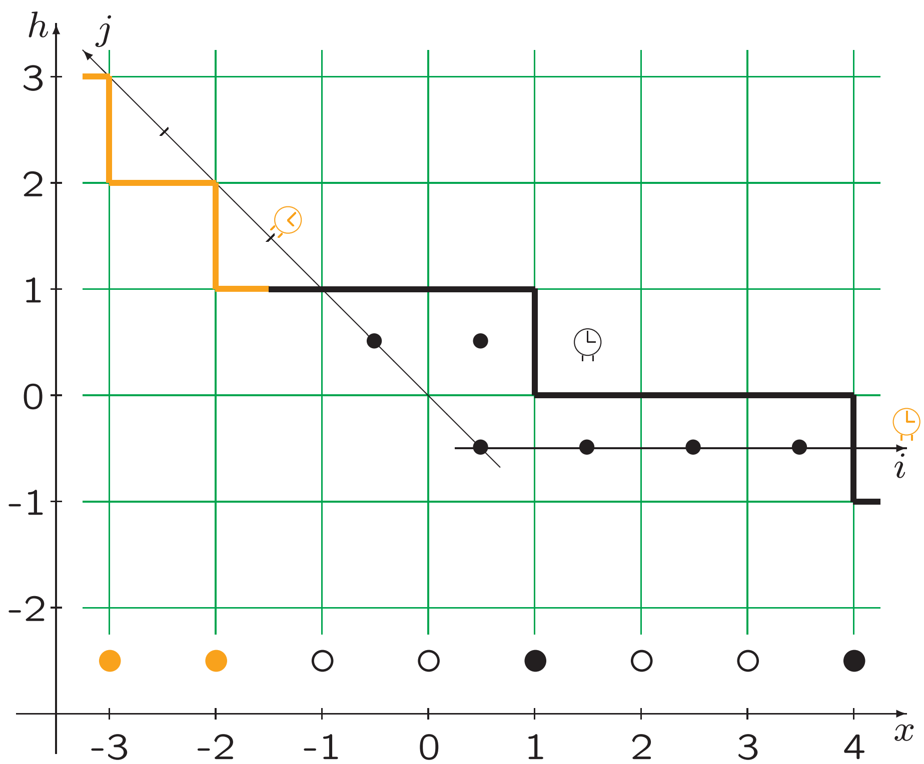
TASEP: Last passage percolation



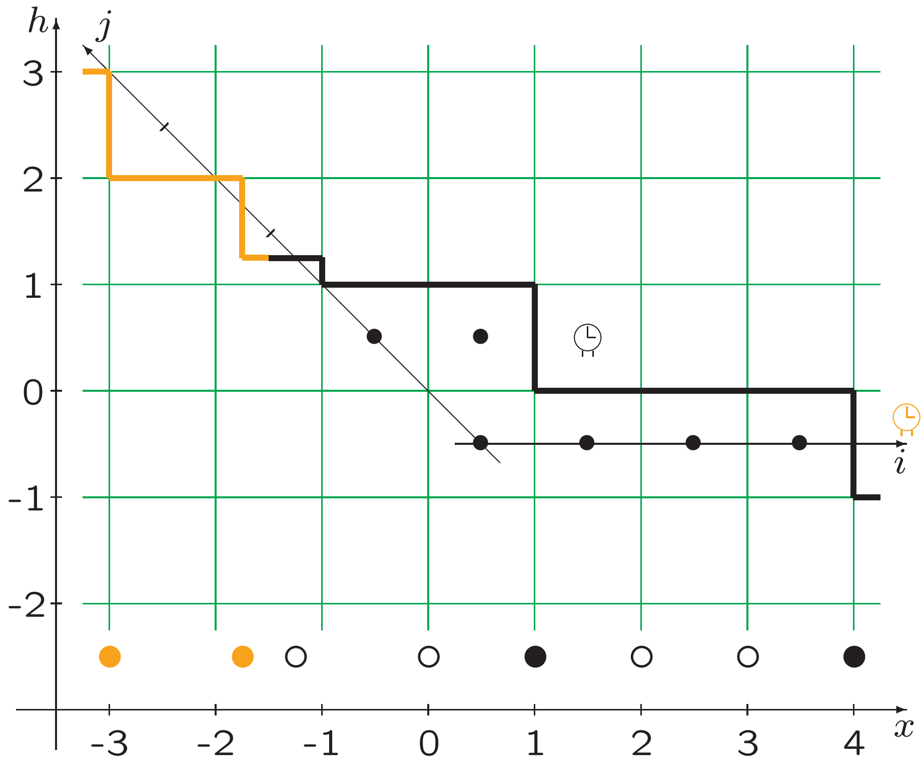
TASEP: Last passage percolation



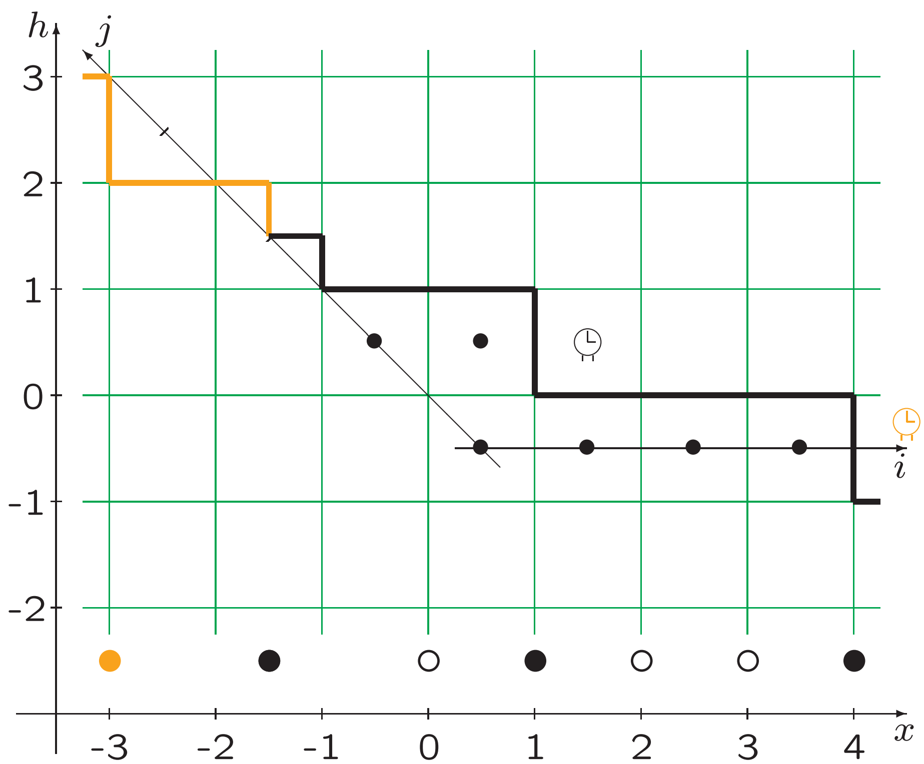
TASEP: Last passage percolation



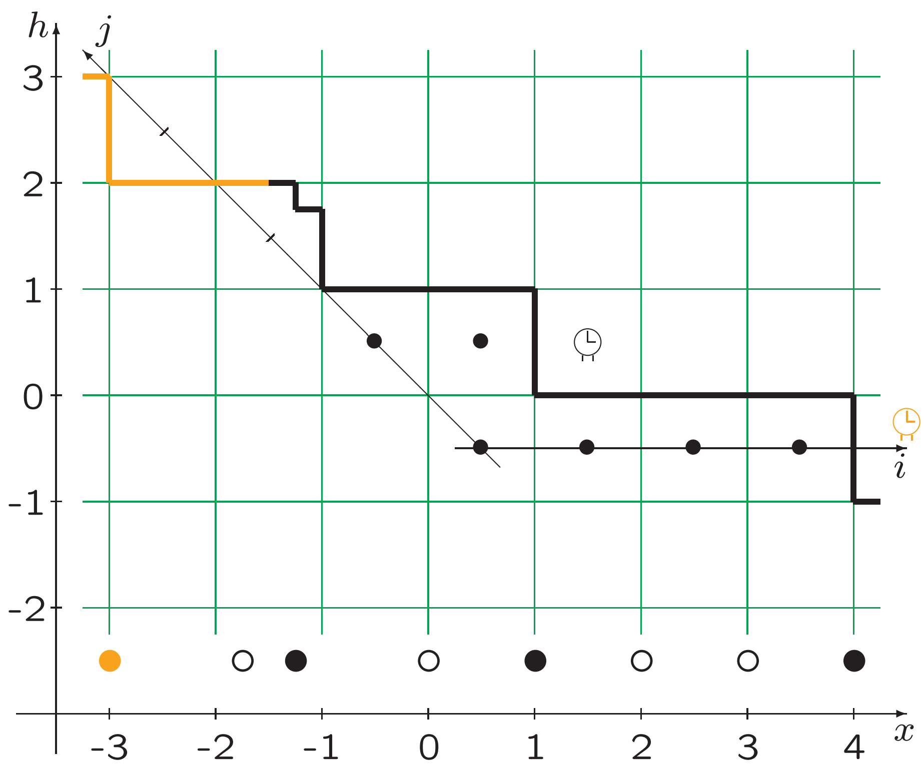
TASEP: Last passage percolation



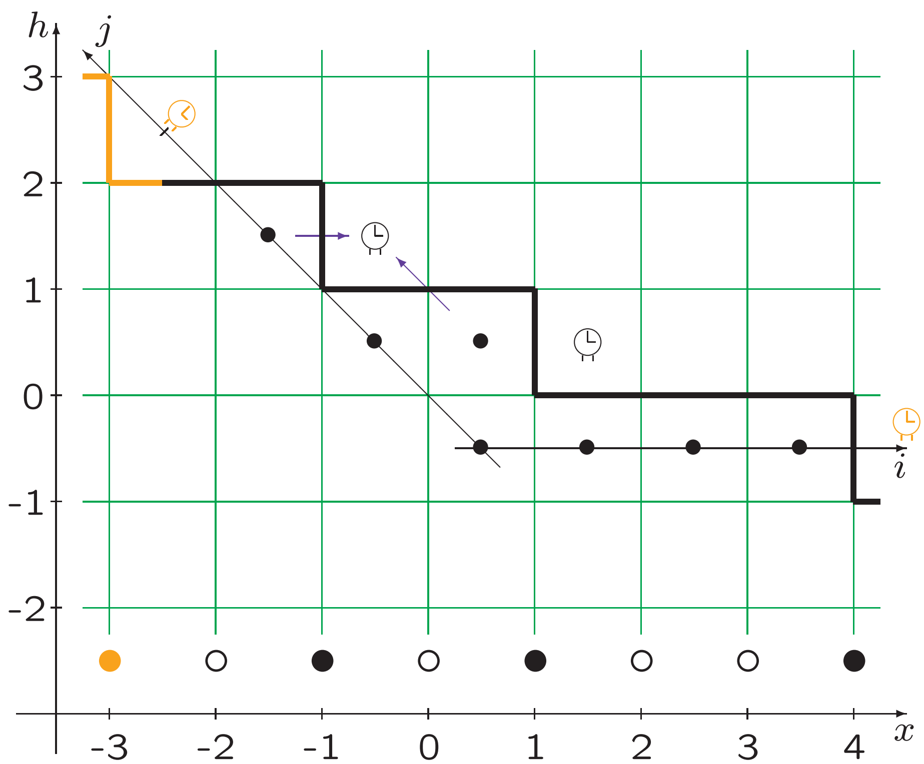
TASEP: Last passage percolation



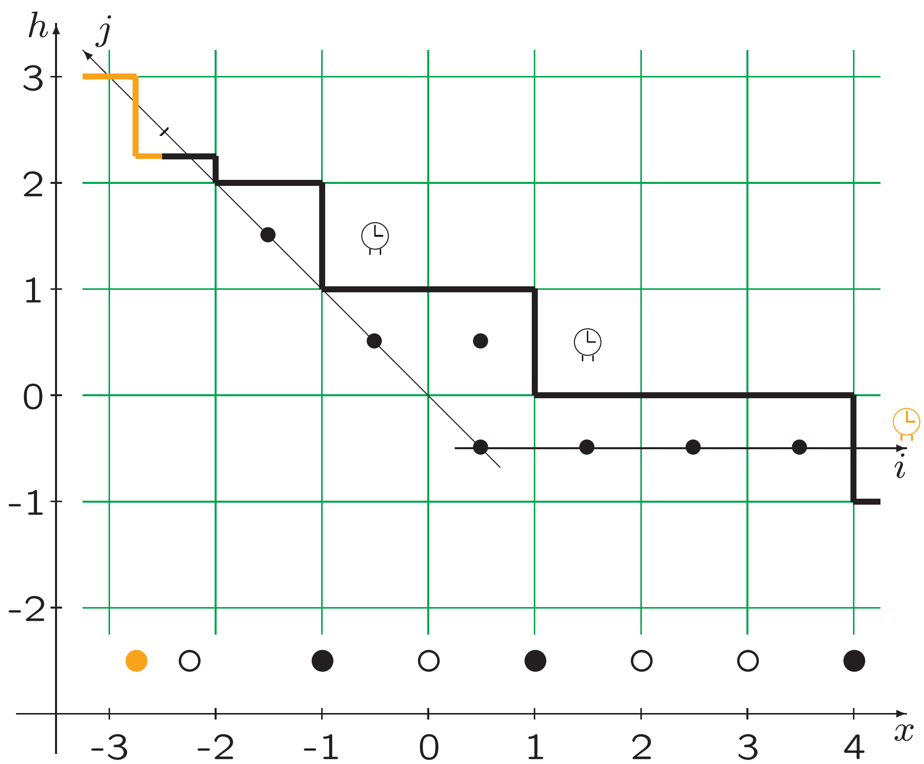
TASEP: Last passage percolation



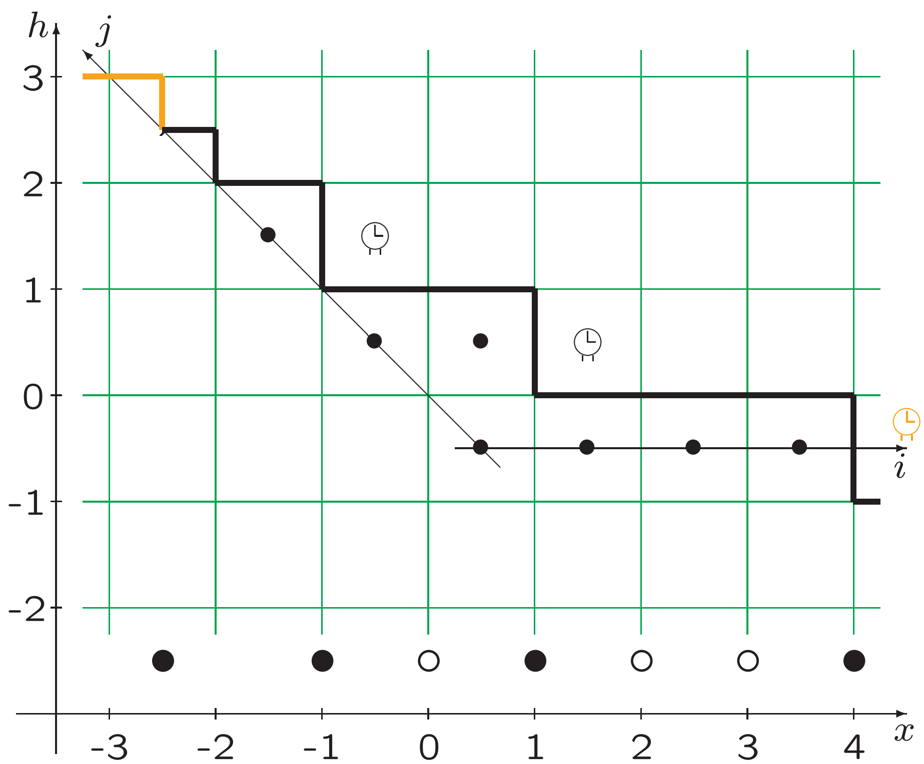
TASEP: Last passage percolation



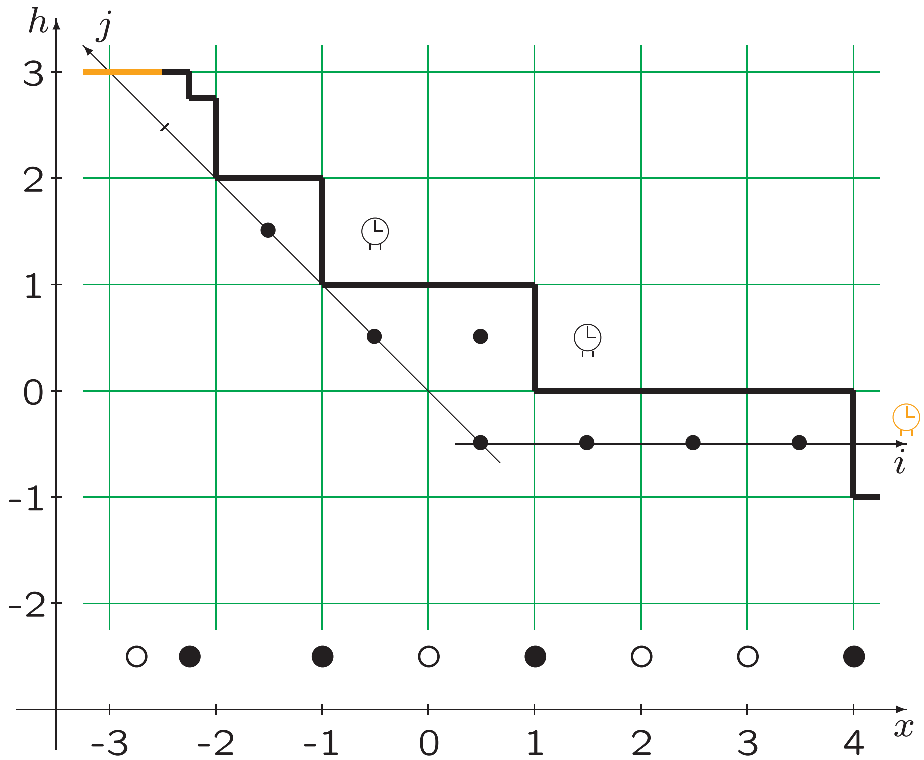
TASEP: Last passage percolation



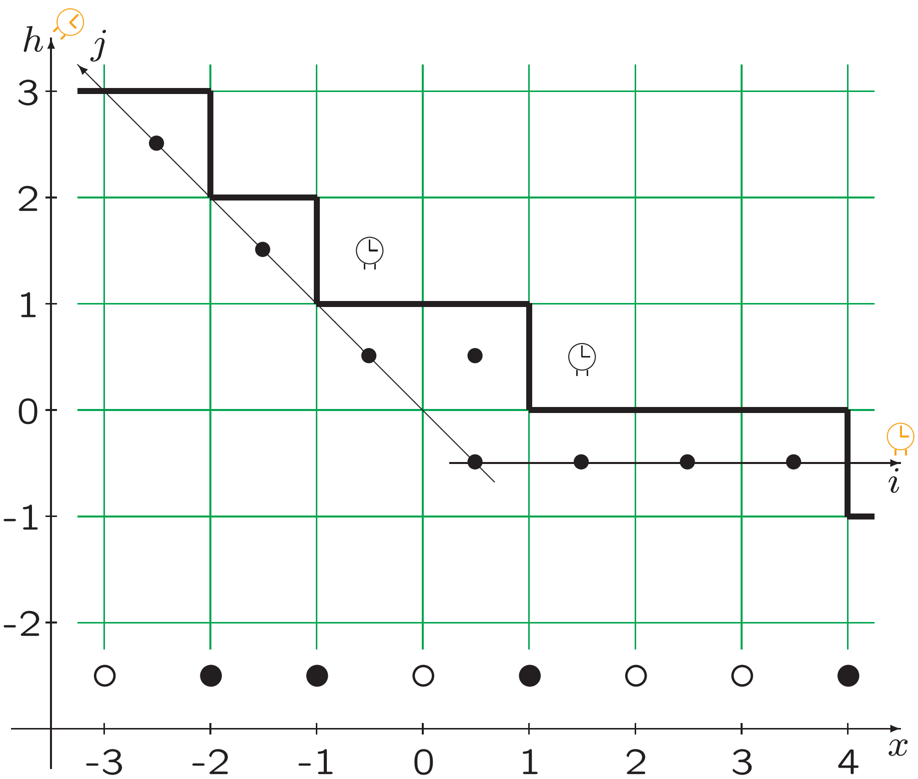
TASEP: Last passage percolation



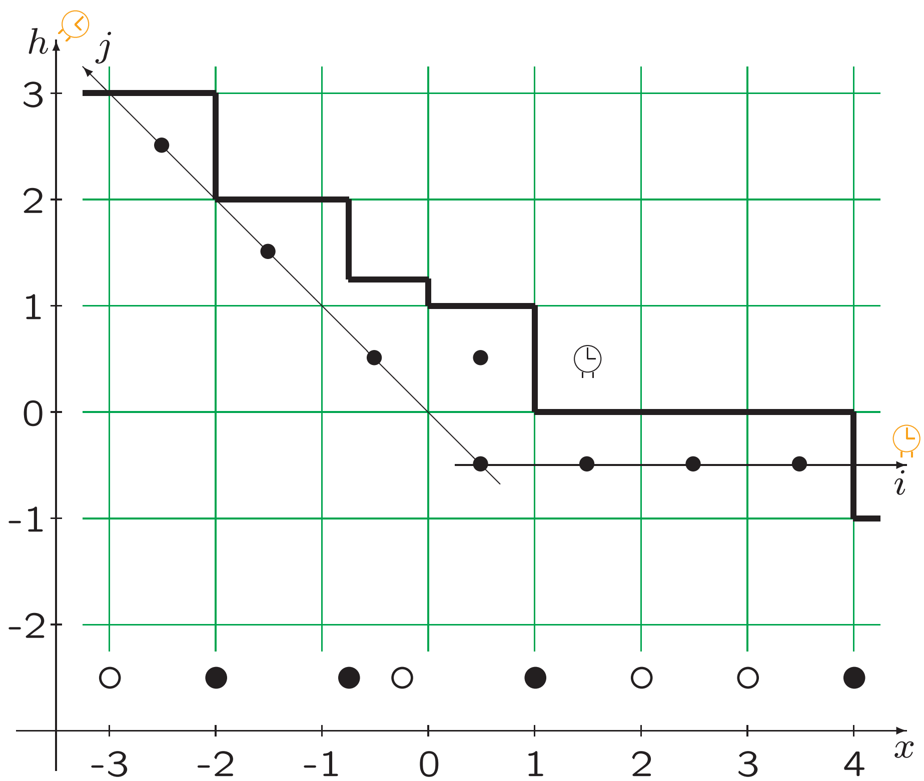
TASEP: Last passage percolation



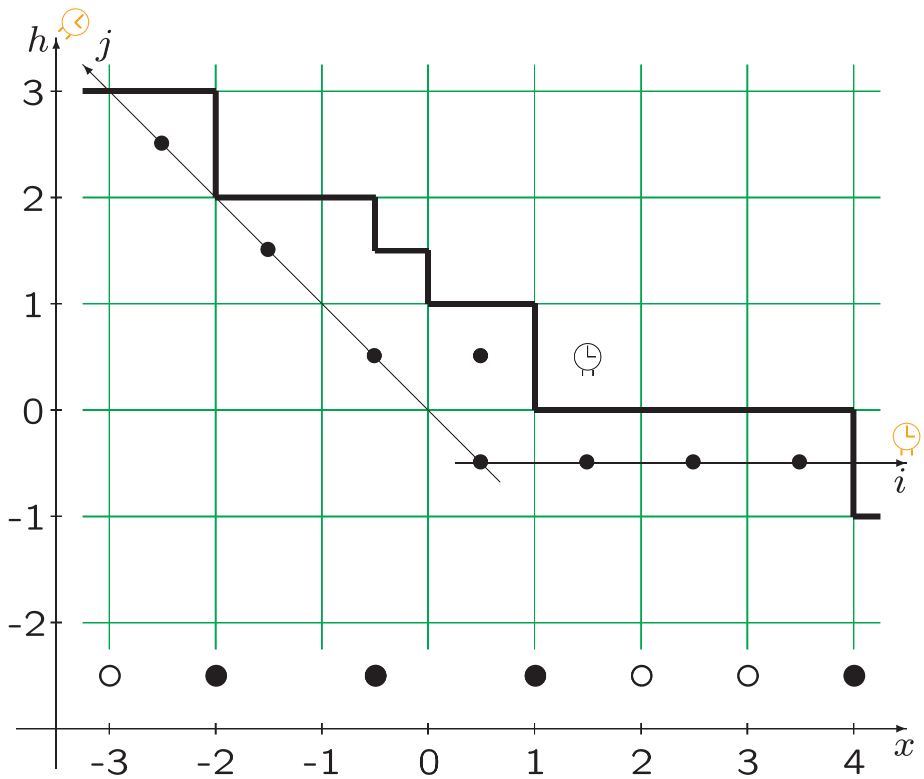
TASEP: Last passage percolation



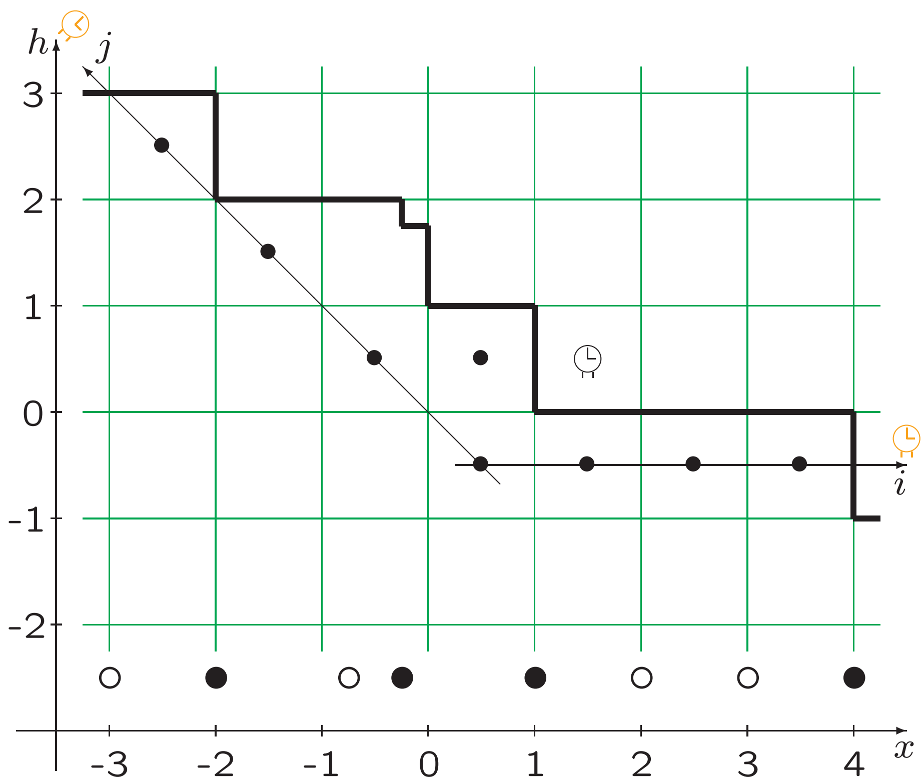
TASEP: Last passage percolation



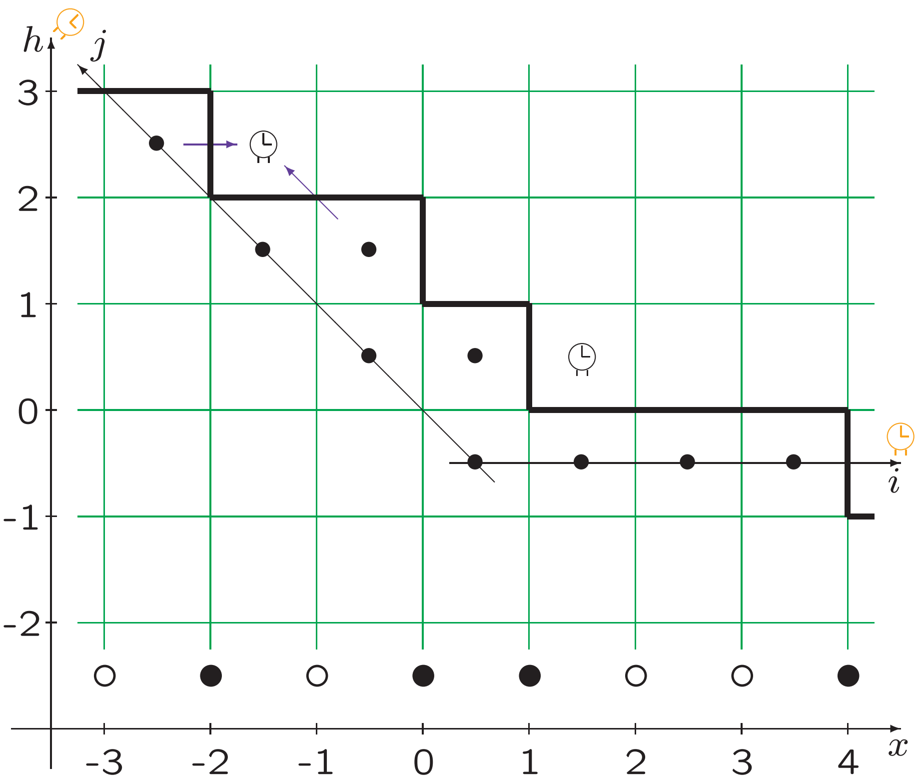
TASEP: Last passage percolation

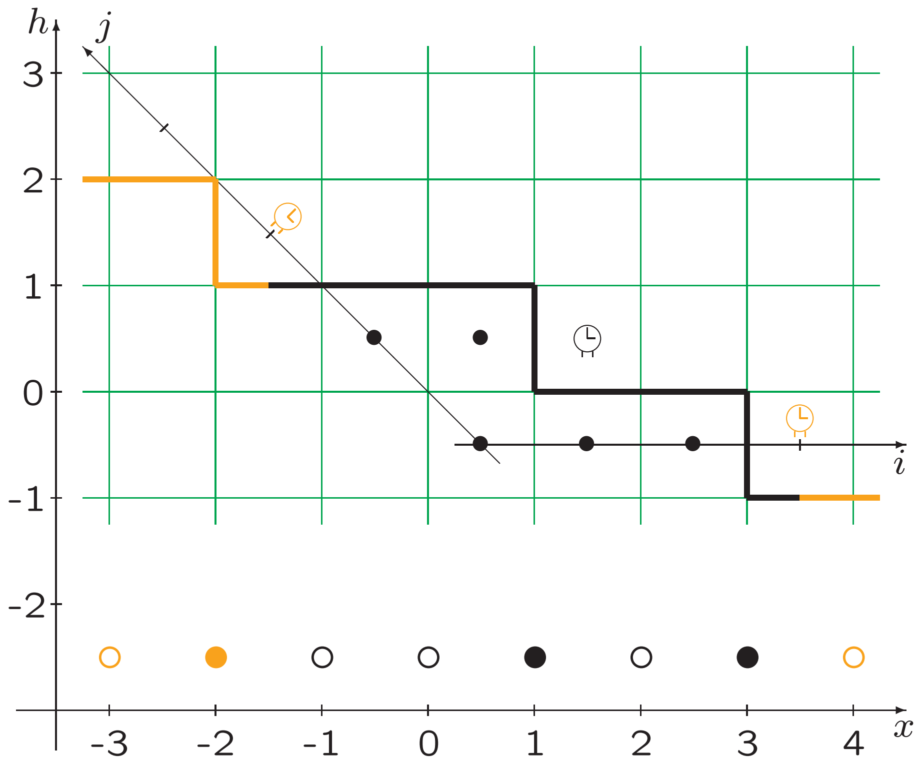


TASEP: Last passage percolation



TASEP: Last passage percolation




h
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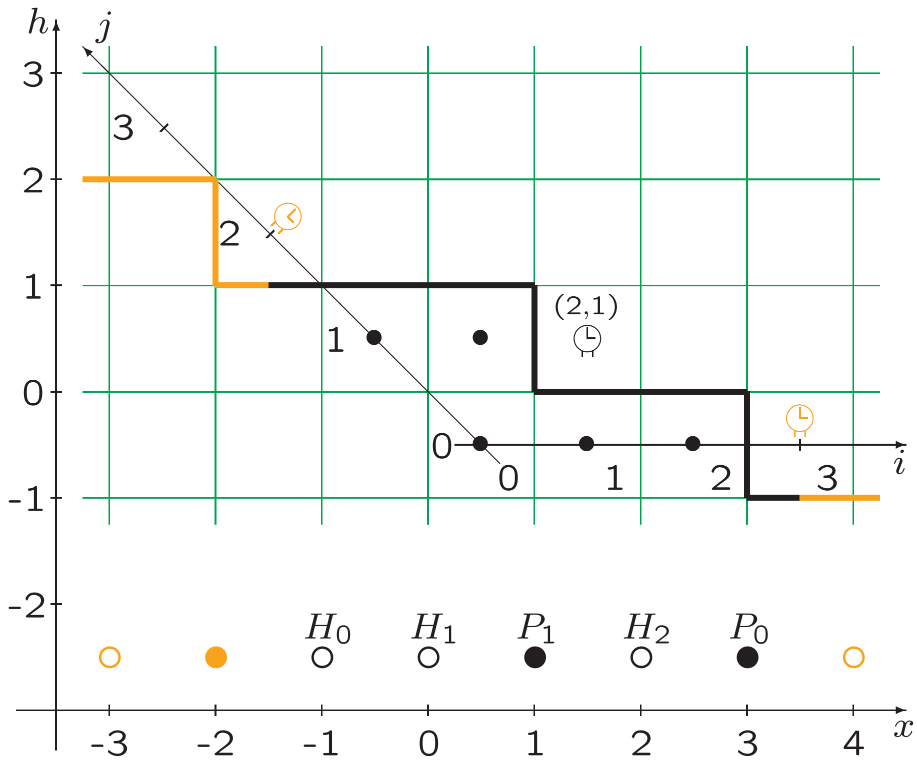
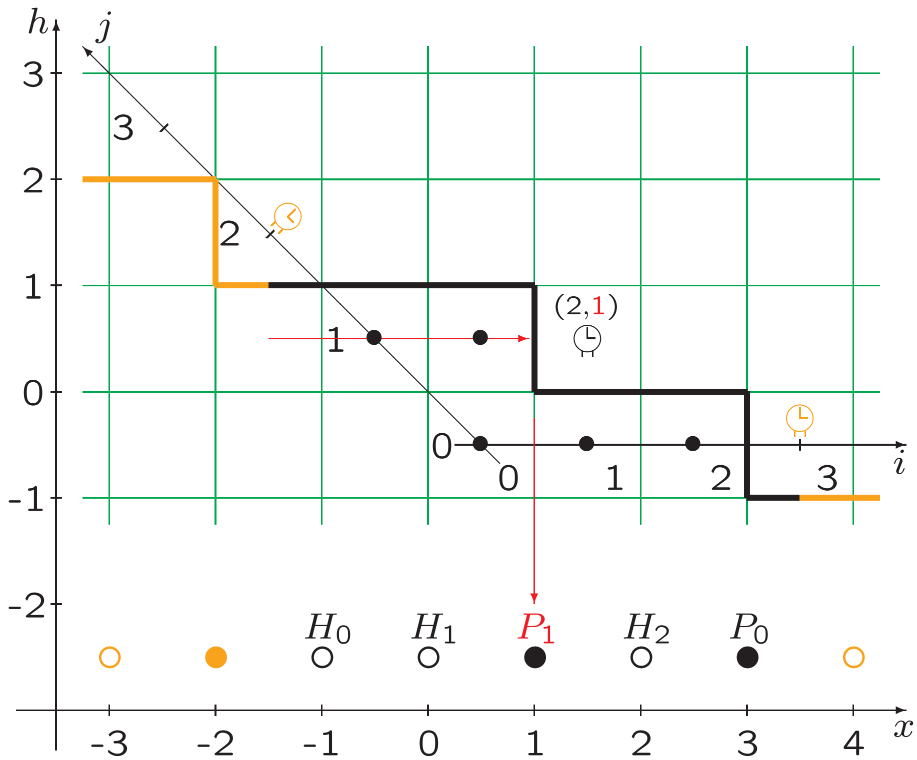
3
4
x



h
j
x
i
(2,1)
H_0
H_1
P_1
H_2
P_0



h
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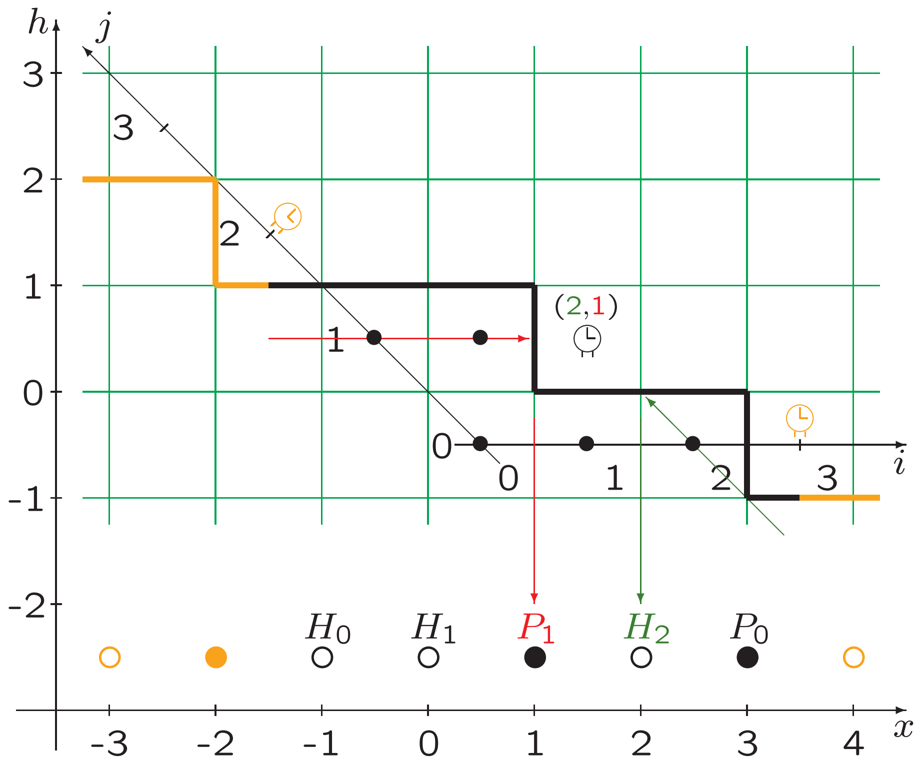
(2,1)
H_0
H_1
P_1
H_2
P_0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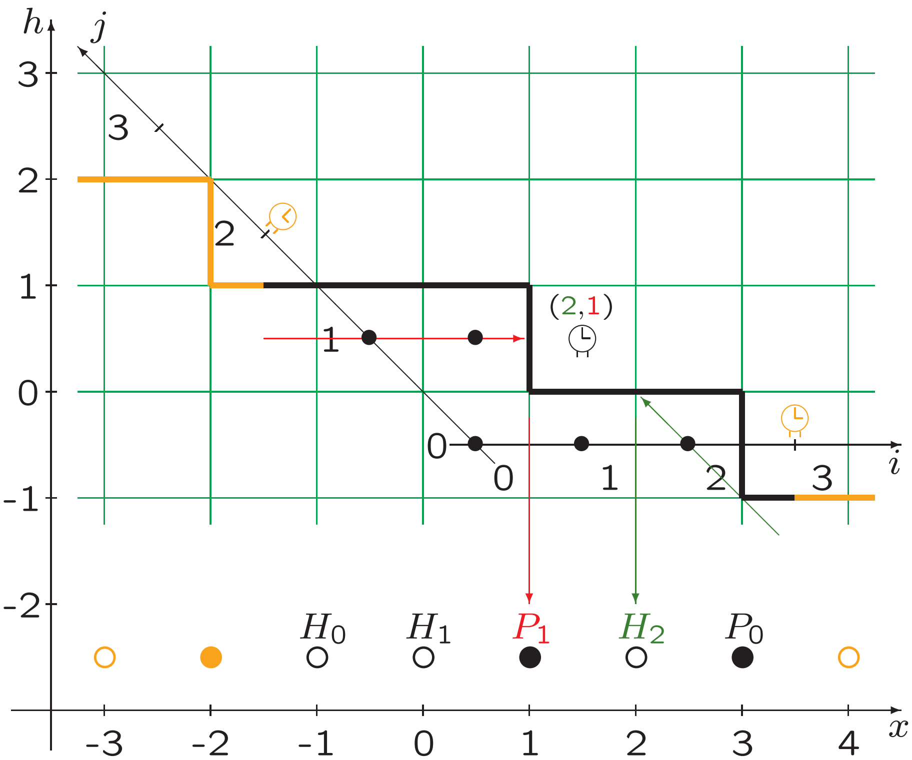
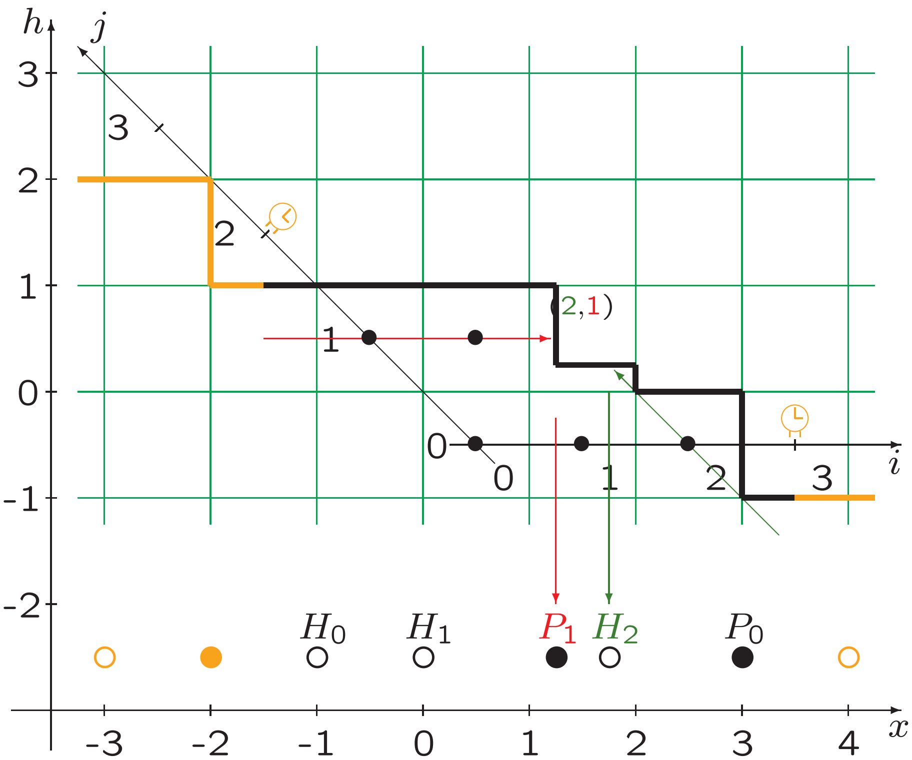


Occupation of (i, j) = jump of P_j over H_i.

Occupation of $(2, 1)$ = jump of P_1 over H_2.



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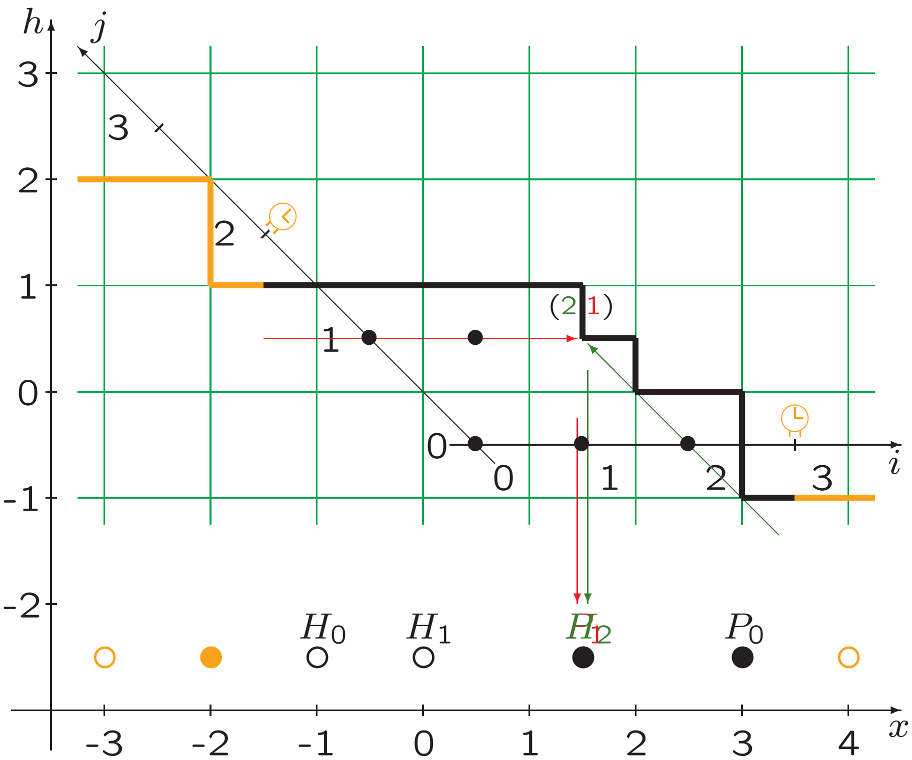

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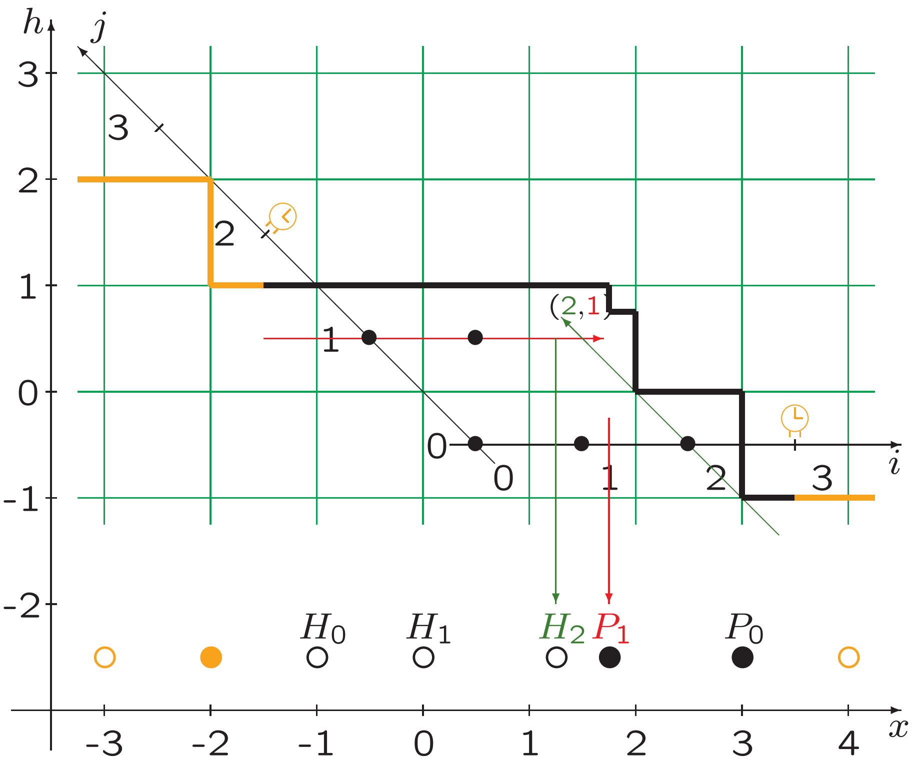

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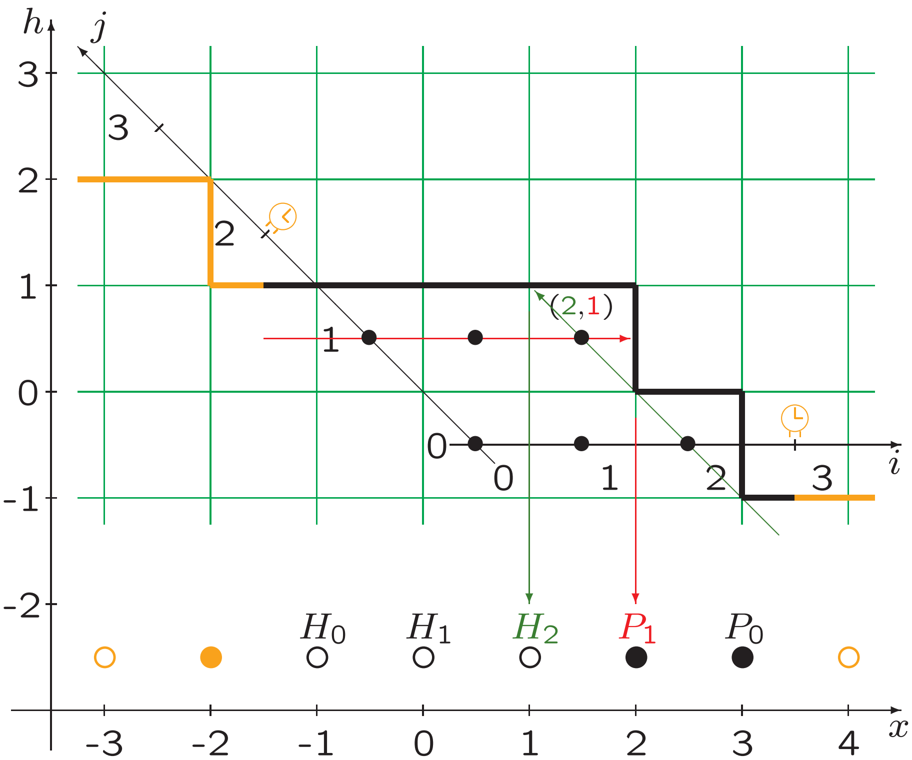

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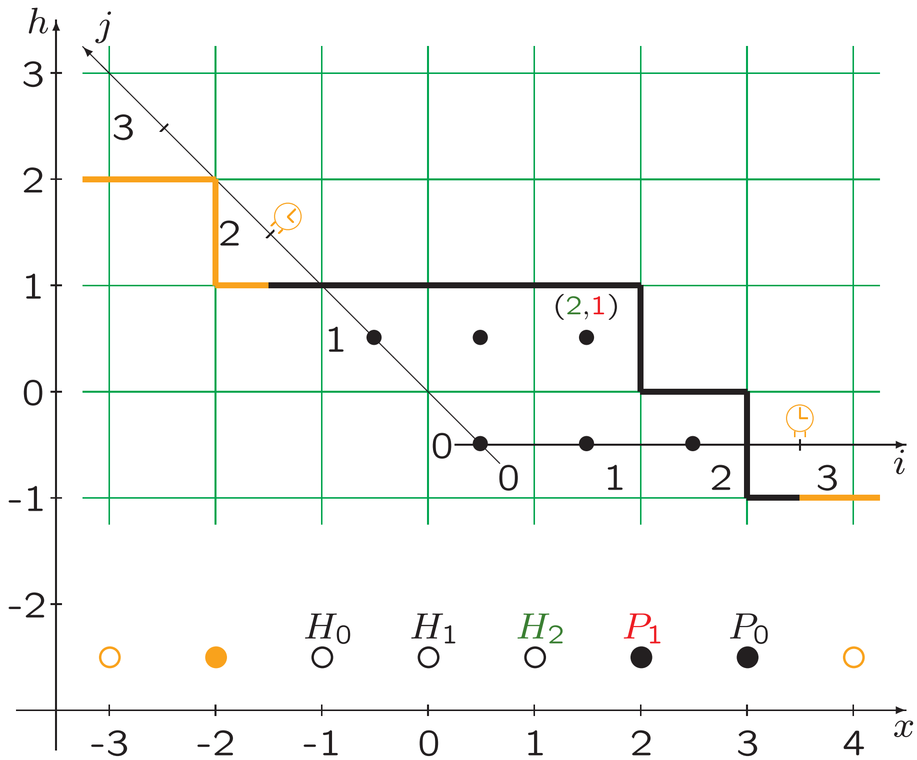
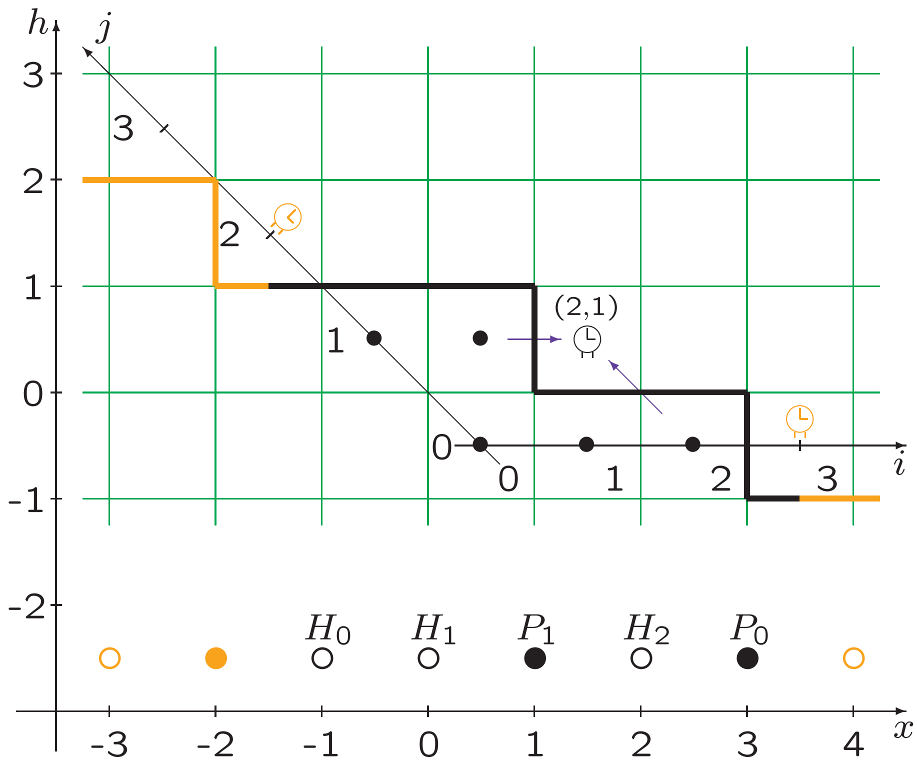


Occupation of (i, j) = jump of P_j over H_i.

Occupation of $(2, 1)$ = jump of P_1 over H_2.

The time when this happens $=: G_{ij}$.



h
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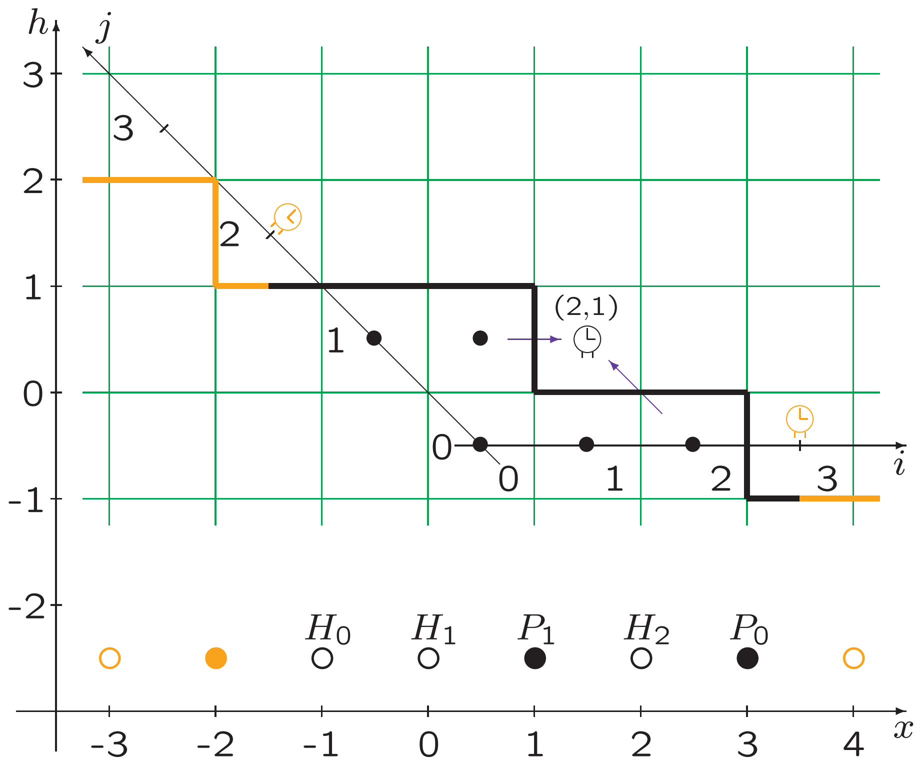
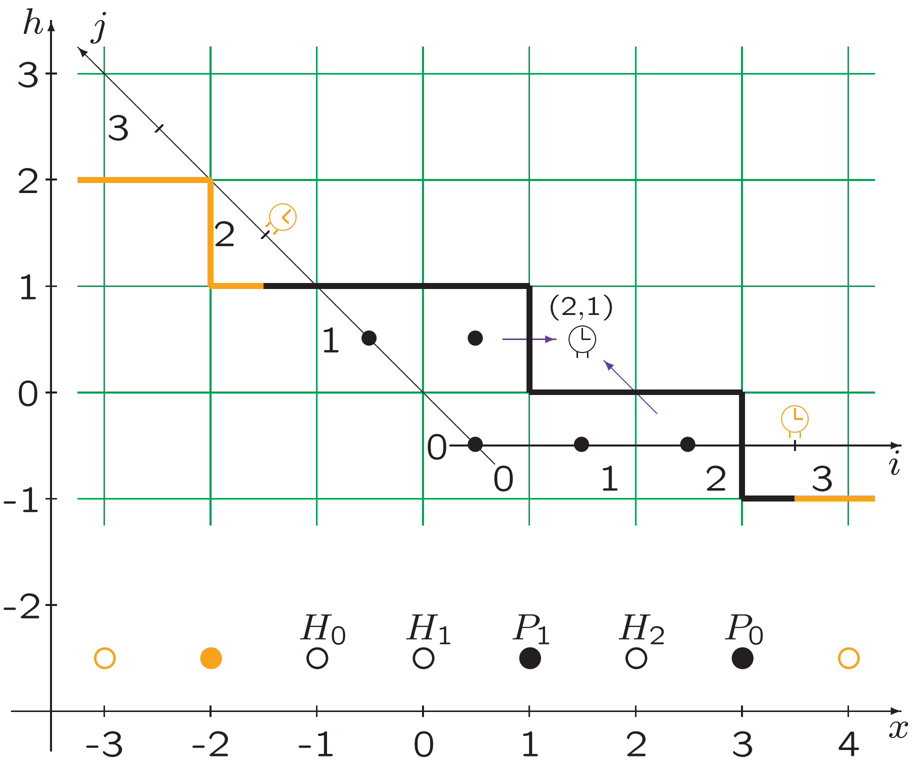


Burke's Theorem:

P_0 jumps according to a Poisson$(1-\varrho)$ process,

governed by the right orange part



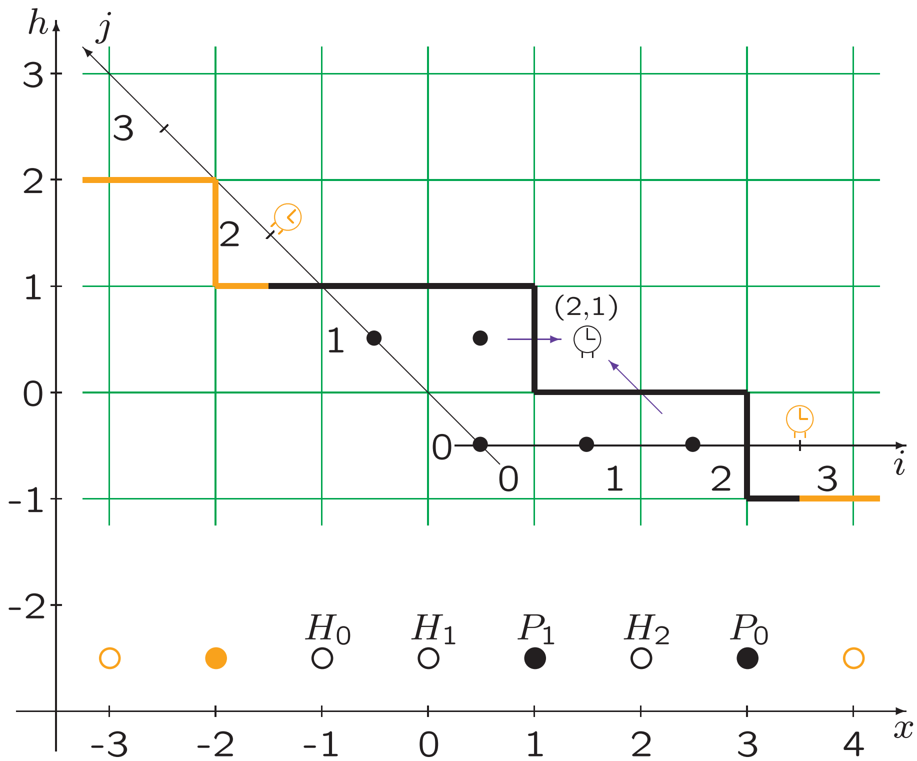
Burke's Theorem:

P_0 jumps according to a Poisson($1-\varrho$) process,

governed by the right orange part

H_0 jumps according to a Poisson(ϱ) process,

governed by the left orange part



Burke's Theorem:

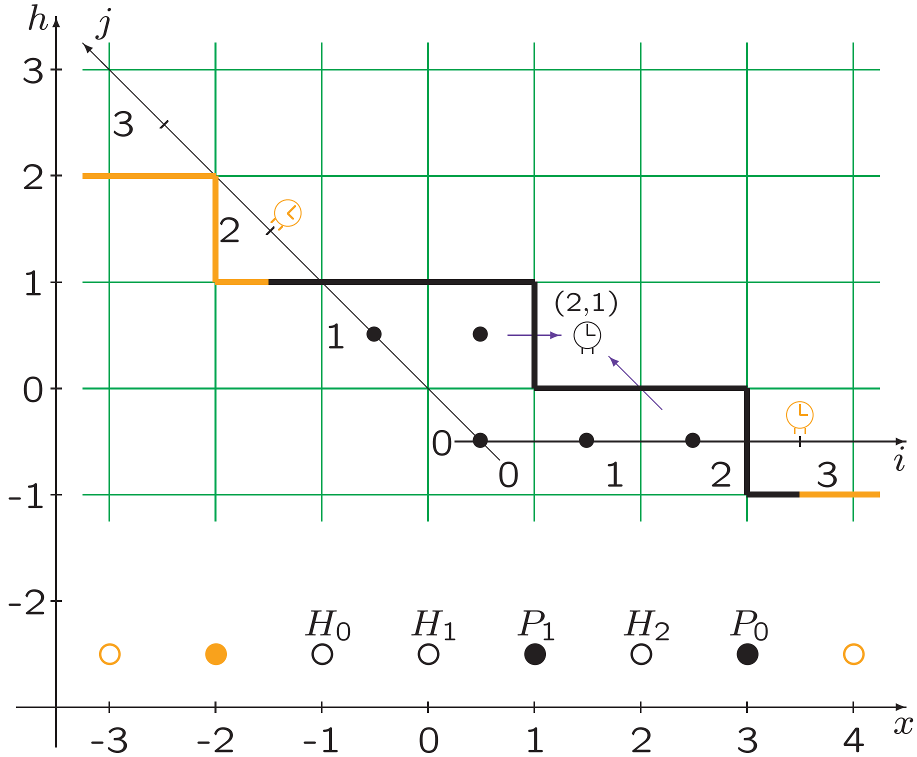
P_0 jumps according to a Poisson($1-\varrho$) process,

governed by the right orange part

H_0 jumps according to a Poisson(ϱ) process,

governed by the left orange part

independently of the ⏲'s.



Burke's Theorem:

P_0 jumps according to a Poisson($1-\varrho$) process,
governed by the right orange part

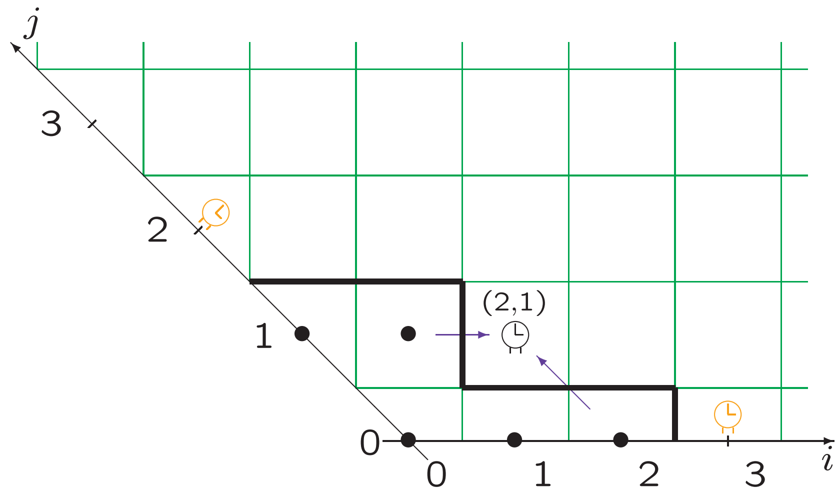
H_0 jumps according to a Poisson(ϱ) process,
governed by the left orange part

independently of the ’s.

Therefore:

$\sim$ Exponential($1-\varrho$)
$\sim$ Exponential(ϱ)
$\sim$ Exponential(1)

} independently



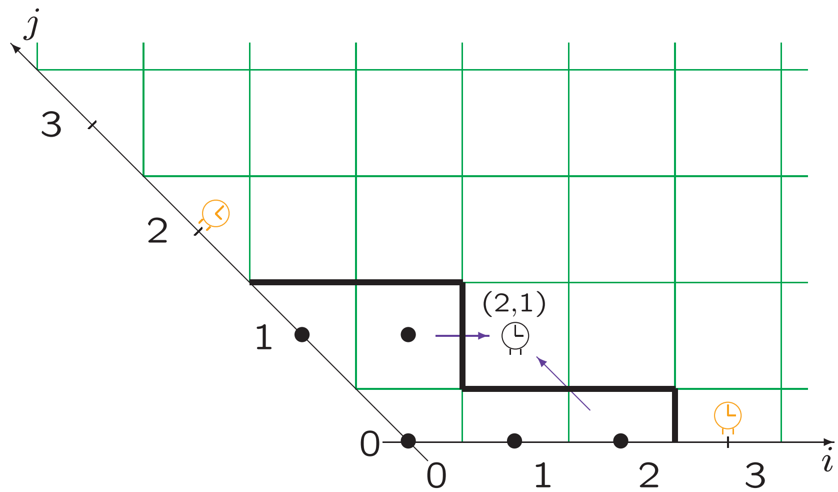
 $\sim$ Exponential$(1-\varrho)$

 $\sim$ Exponential(ϱ)

 $\sim$ Exponential(1)

independently

The last passage model



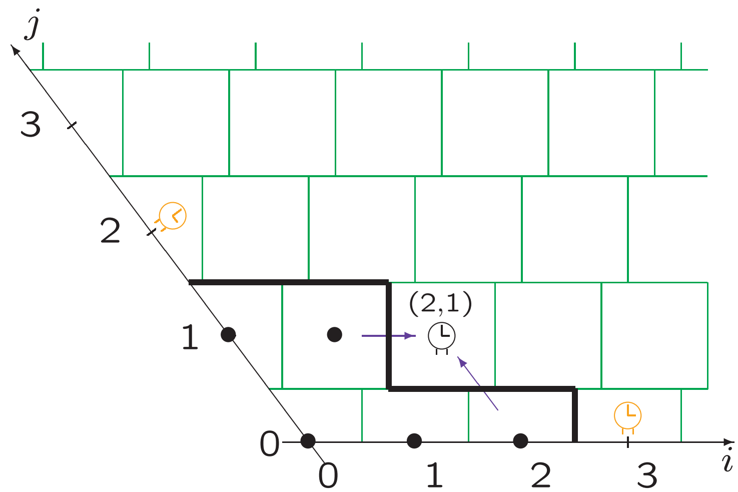
$\sim$ Exponential$(1-\varrho)$

$\sim$ Exponential(ϱ)

$\sim$ Exponential(1)

} independently

The last passage model



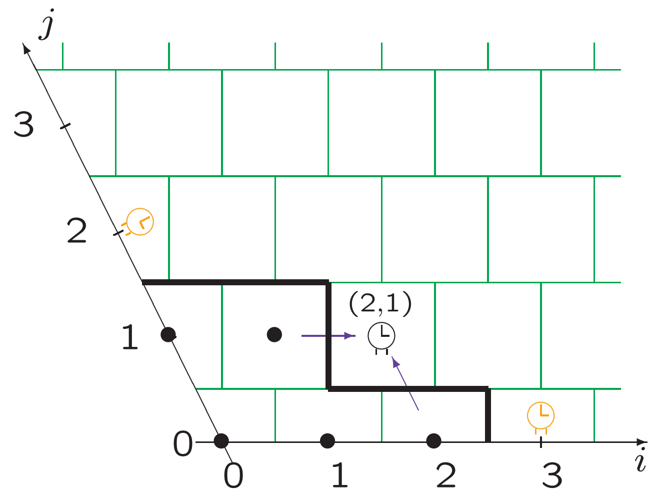
$\sim$ Exponential$(1 - \varrho)$

$\sim$ Exponential(ϱ)

$\sim$ Exponential(1)

} independently

The last passage model



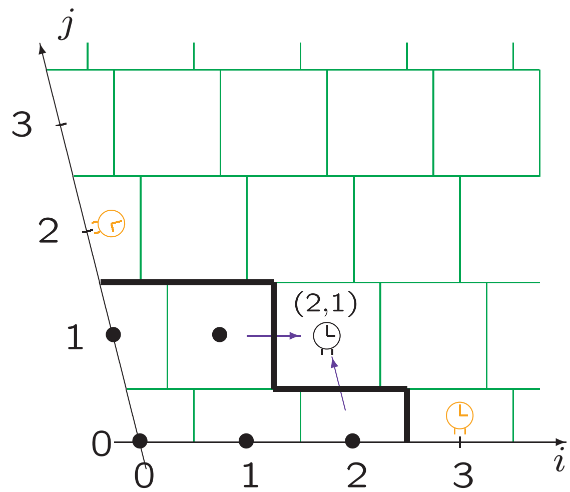
$\sim$ Exponential$(1 - \varrho)$

$\sim$ Exponential(ϱ)

$\sim$ Exponential(1)

independently

The last passage model



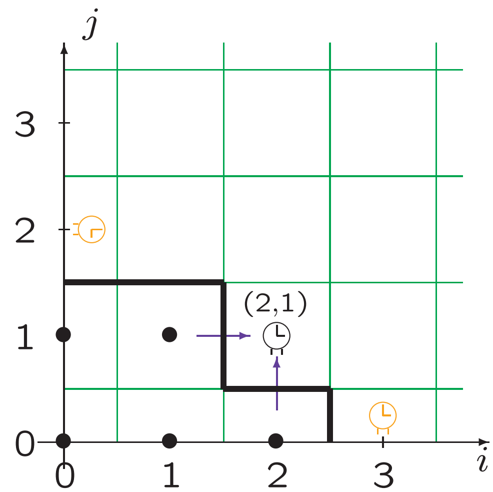
$\sim$ Exponential$(1 - \varrho)$

$\sim$ Exponential(ϱ)

$\sim$ Exponential(1)

} independently

The last passage model



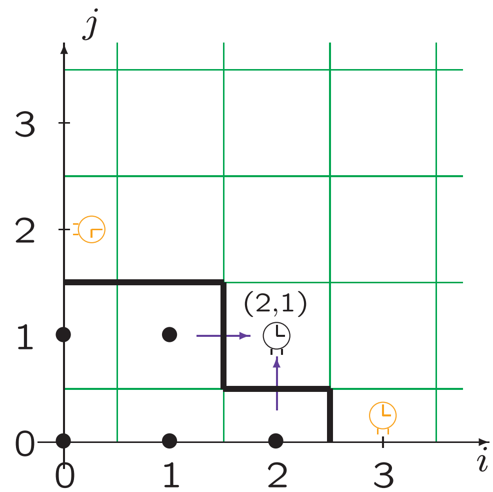
$\sim$ Exponential$(1-\varrho)$

$\sim$ Exponential(ϱ)

$\sim$ Exponential(1)

independently

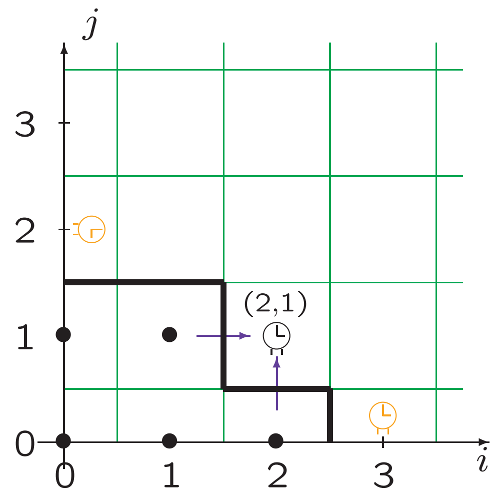
The last passage model



[clock] $\sim$ Exponential$(1-\varrho)$
[clock] $\sim$ Exponential(ϱ)
[clock] $\sim$ Exponential(1)
} independently

[clock] starts ticking when its west neighbor becomes occupied

The last passage model



$\sim$ Exponential$(1-\varrho)$

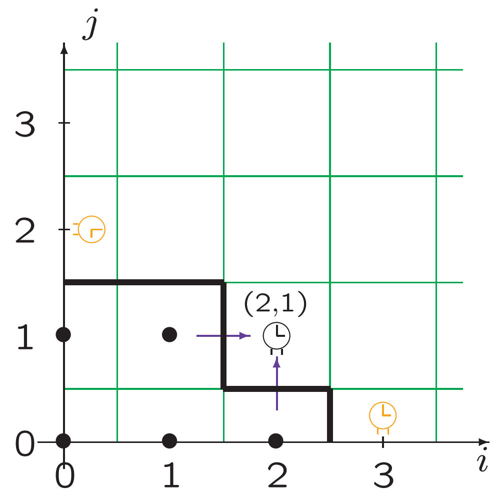
$\sim$ Exponential(ϱ) — independently

$\sim$ Exponential(1)

starts ticking when its west neighbor becomes occupied

starts ticking when its south neighbor becomes occupied

The last passage model



$\sim$ Exponential$(1-\varrho)$
$\sim$ Exponential(ϱ)
$\sim$ Exponential(1)

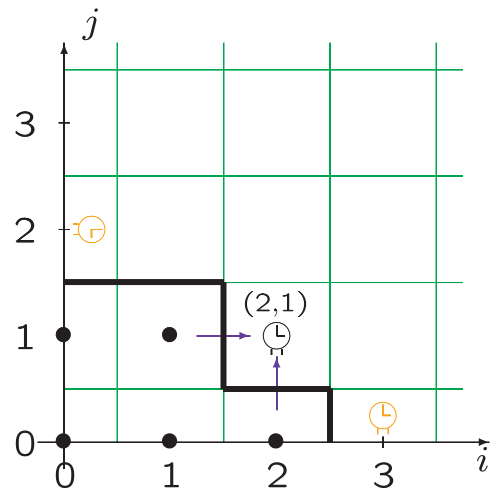
} independently

starts ticking when its west neighbor becomes occupied

starts ticking when its south neighbor becomes occupied

starts ticking when both its west and south neighbors become occupied

The last passage model



M. Prähofer and H. Spohn 2002

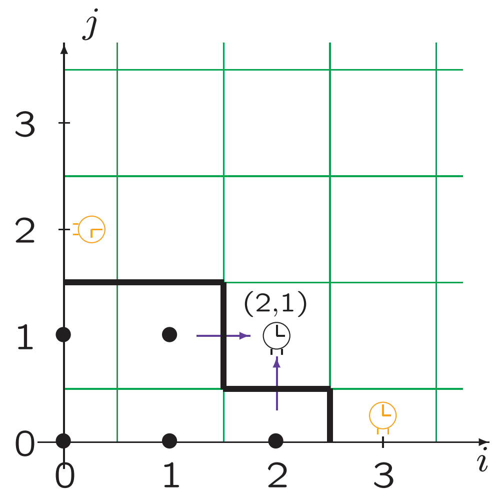
$\sim$ Exponential$(1 - \varrho)$
$\sim$ Exponential(ϱ)
$\sim$ Exponential(1)
} independently

starts ticking when its west neighbor becomes occupied

starts ticking when its south neighbor becomes occupied

starts ticking when both its west and south neighbors become occupied

The last passage model



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G_{ij} = the occupation time of (i, j)

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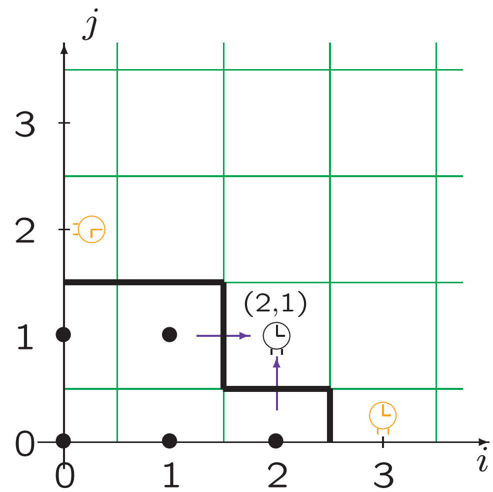

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G_{ij} = the maximum weight collected by a north-east path from $(0,0)$ to (i,j).

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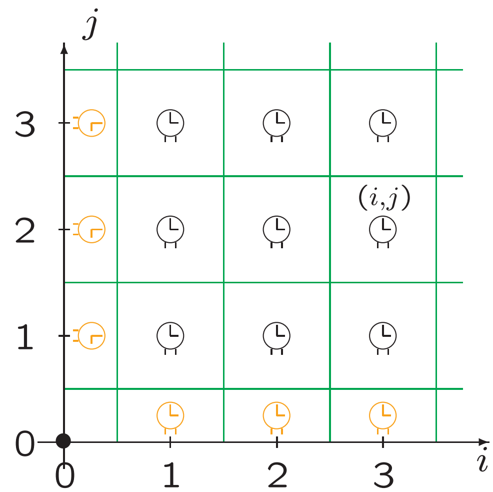

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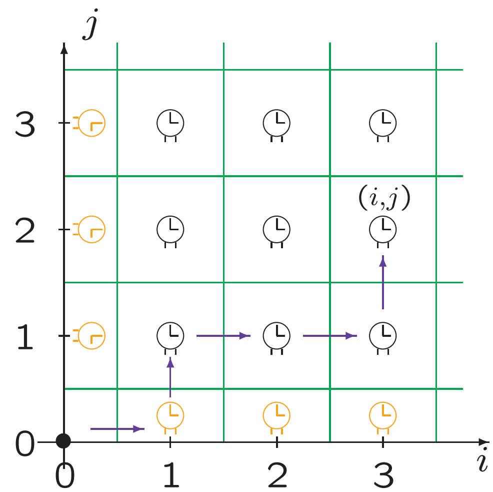

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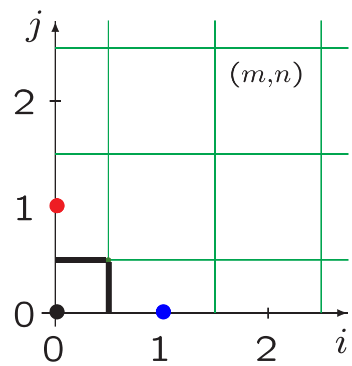

Ferrari, Martin, Pimentel (2005)

Which squares are infected via $(1, 0)$ and via $(0, 1)$?

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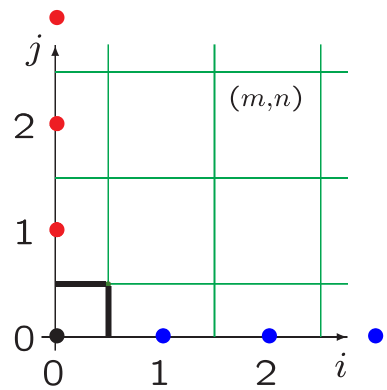

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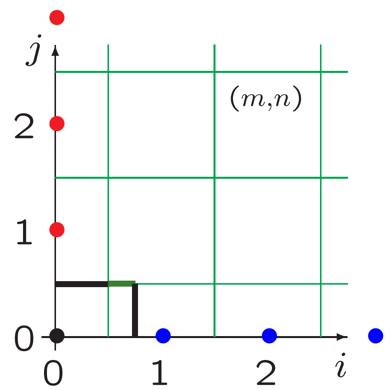

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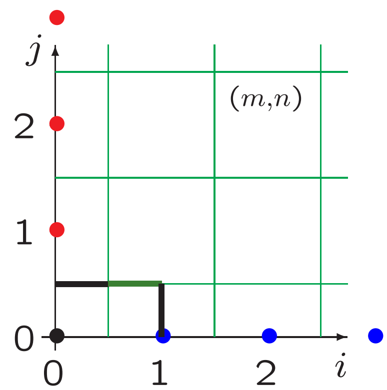

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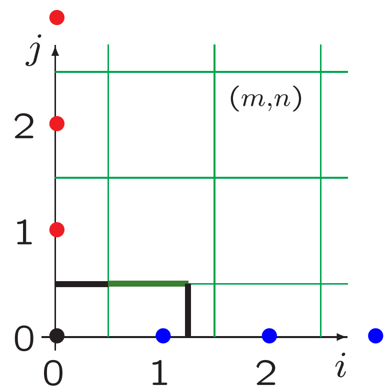

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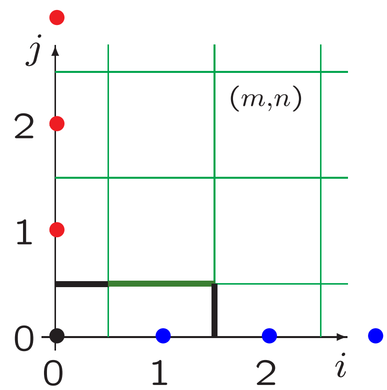

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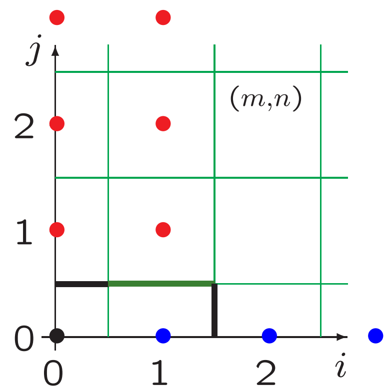

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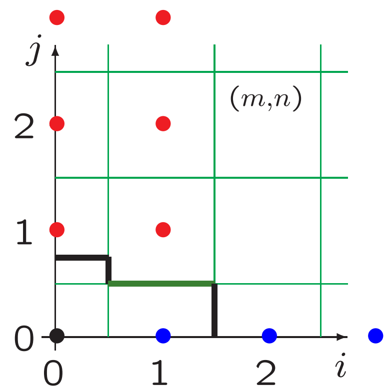

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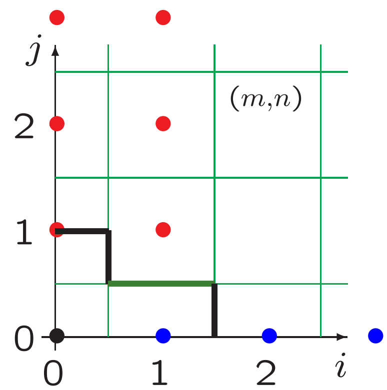

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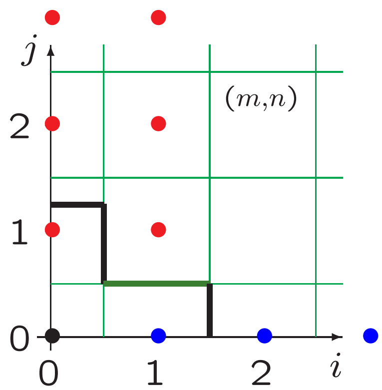

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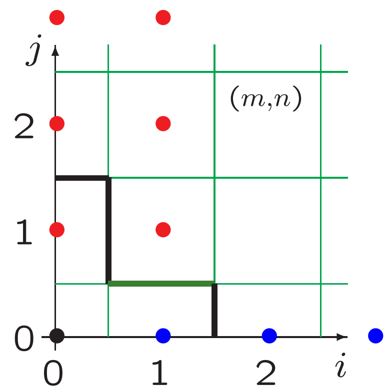

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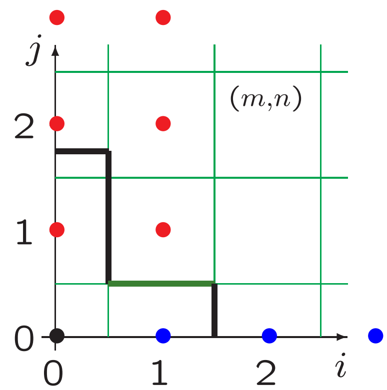

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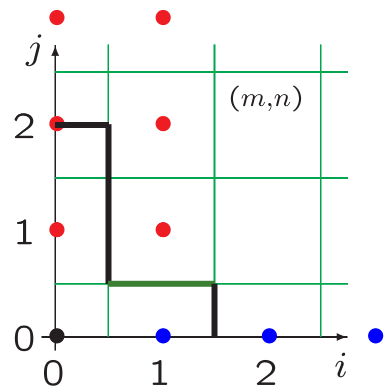

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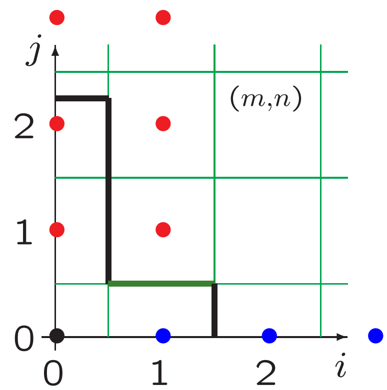

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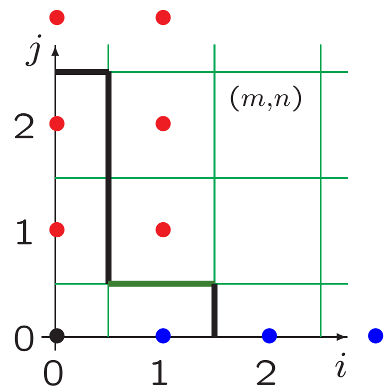

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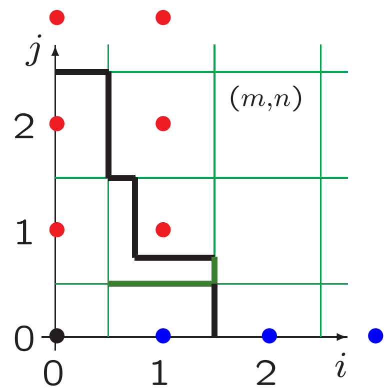

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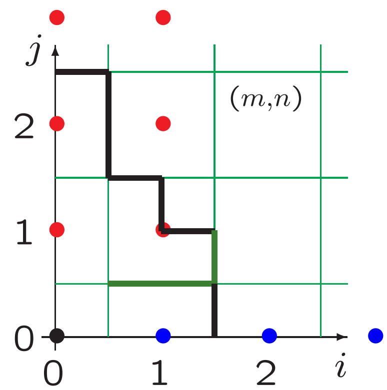

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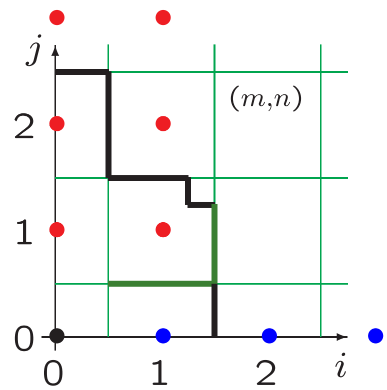

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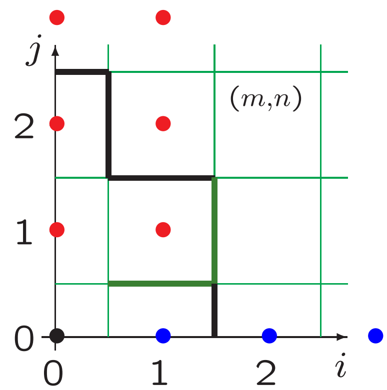

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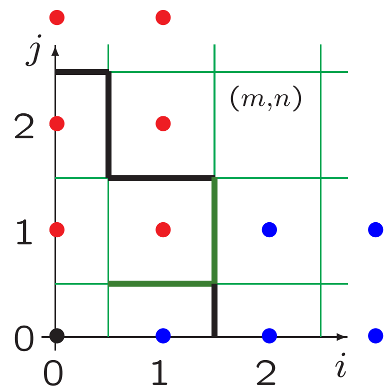

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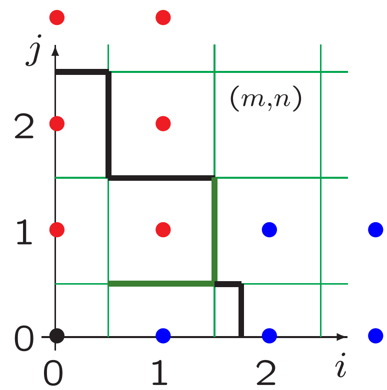

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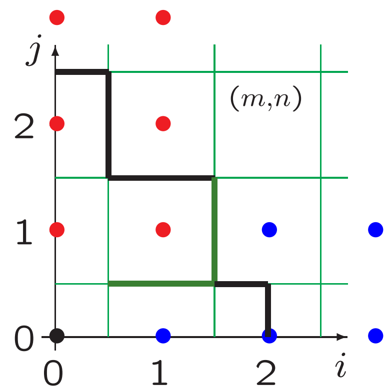

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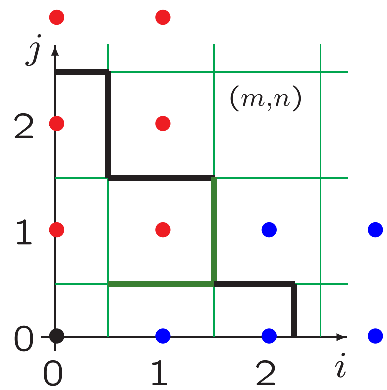

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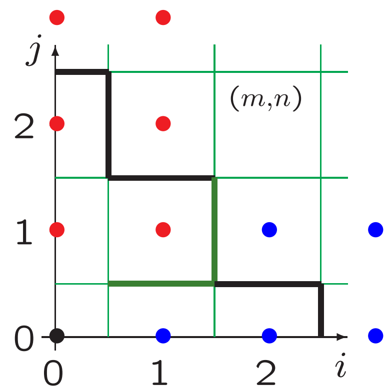

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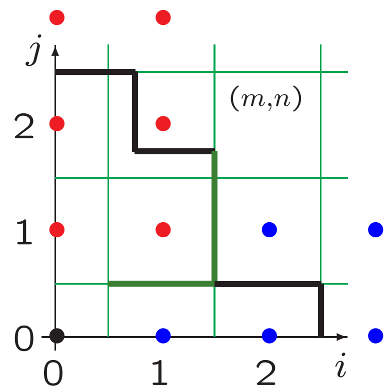

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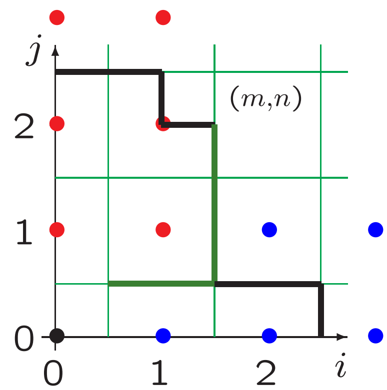

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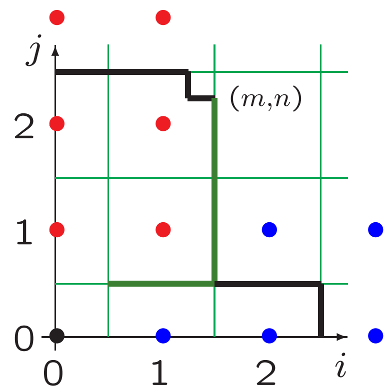

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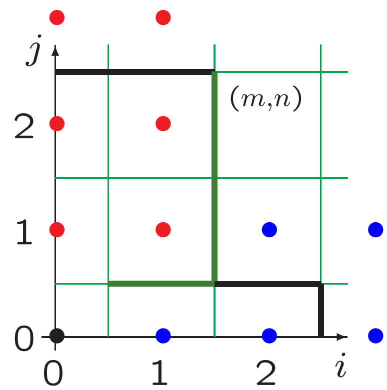

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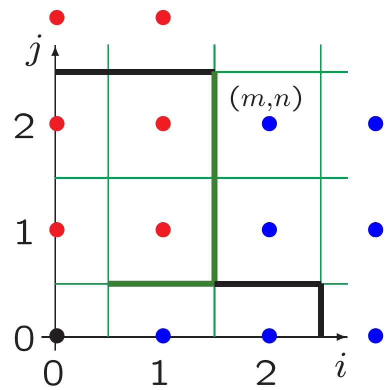

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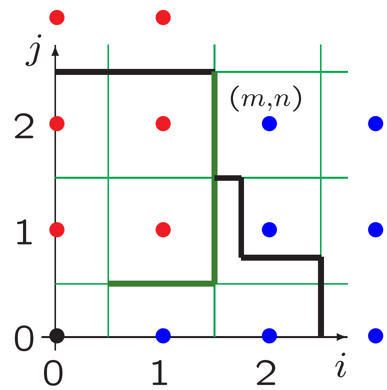

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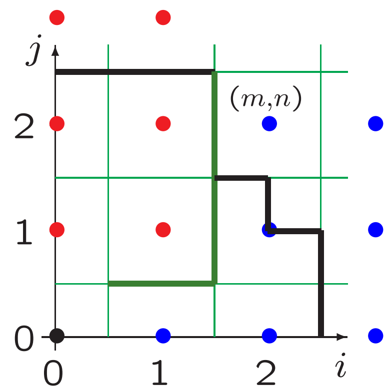

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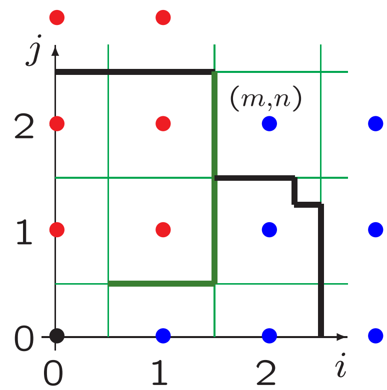

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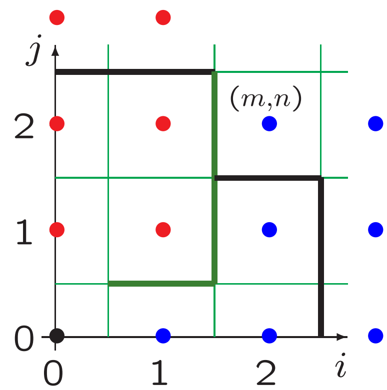

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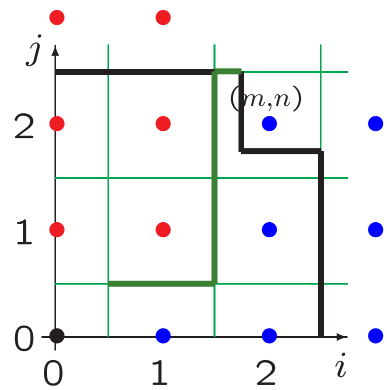

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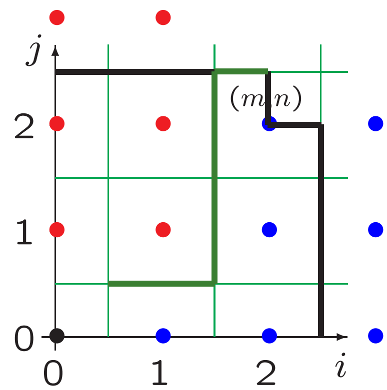

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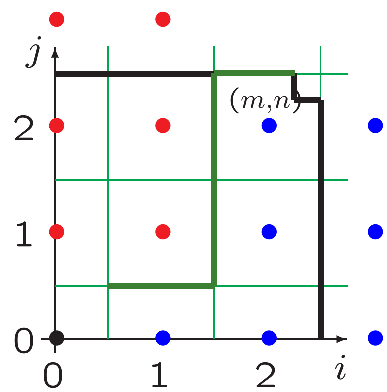

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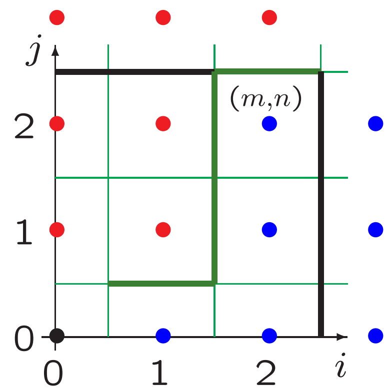

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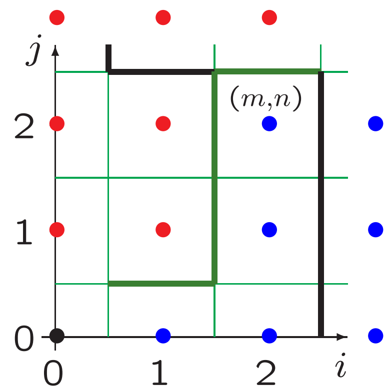

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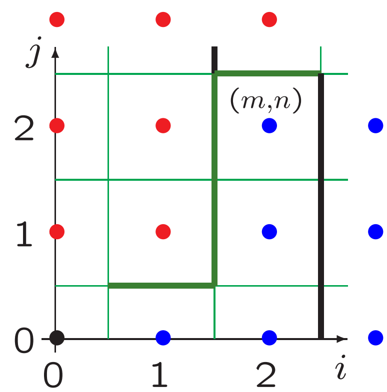

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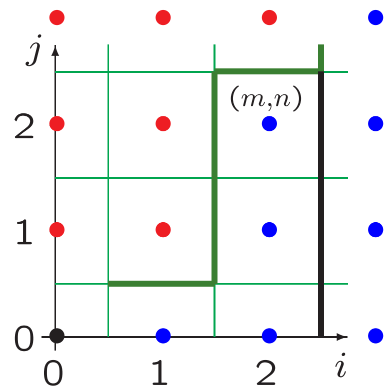

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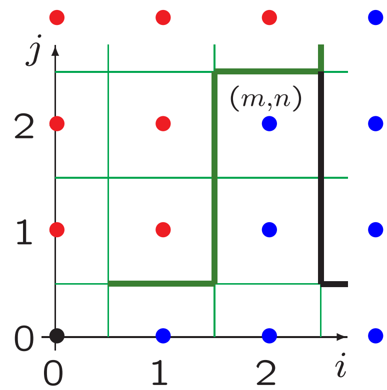

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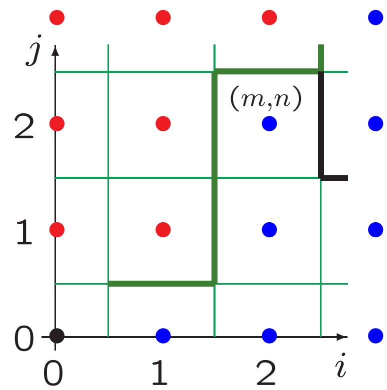

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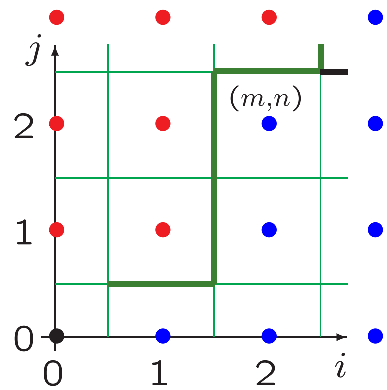

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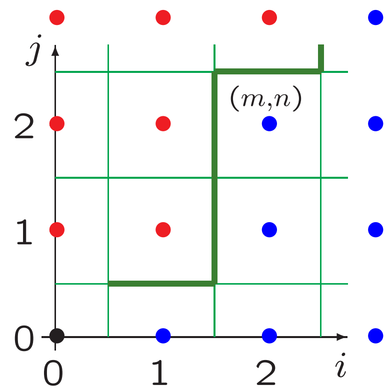

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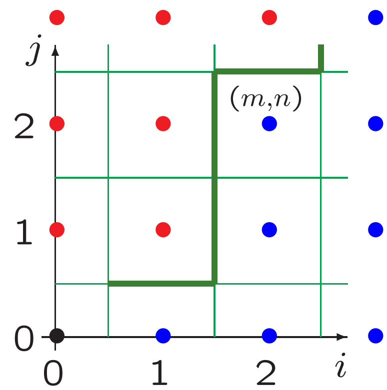

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The competition interface follows the same rules as the *second class particle* of simple exclusion.

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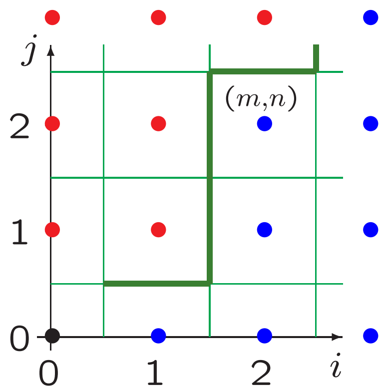

Ferrari, Martin, Pimentel (2005)

Which squares are infected via $(1,0)$ and via $(0,1)$?

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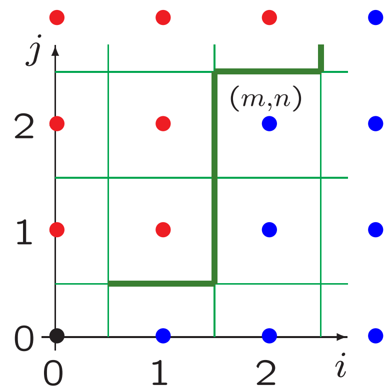
If it passes left of (m,n), then G_{mn} is not sensitive to decreasing the weights on the j-axis.

If it passes below (m,n), then G_{mn} is not sensitive to decreasing the weights on the i-axis.

The competition interface



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Thank you.