

B-Spline Blossoms

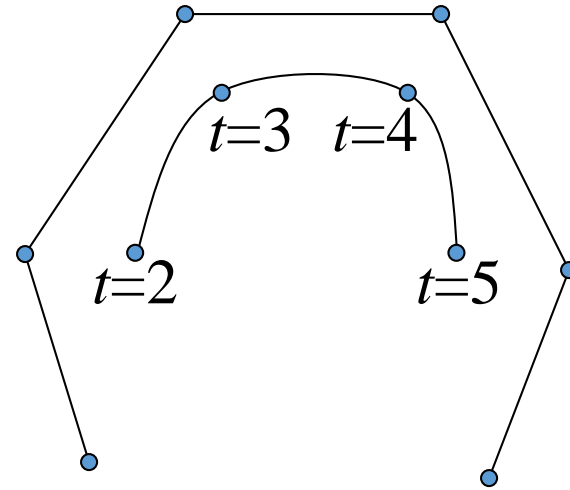
CS 418

Interactive Computer Graphics

John C. Hart

The Blossoming Game

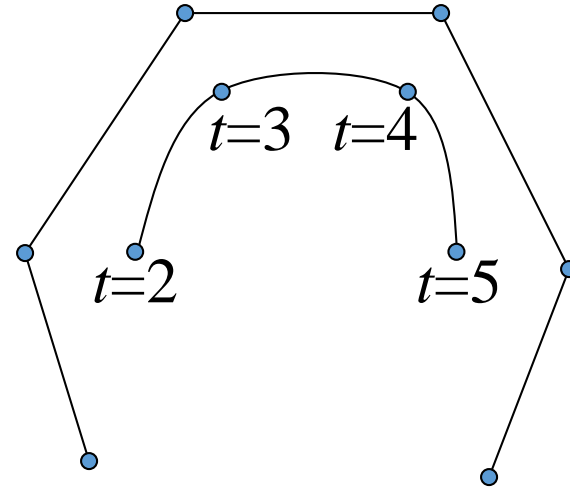
B-Spline Rules for Setting Up the Board



The Blossoming Game

B-Spline Rules for Setting Up the Board

1. Create a knot vector
(with two extra values at each end)

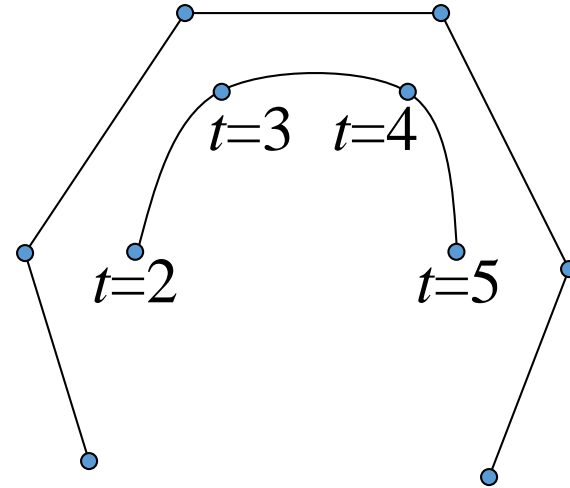


knot vector: $[0 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7]$

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1. Create a knot vector
(with two extra values at each end)
2. Label each control vertex
with triples of knots

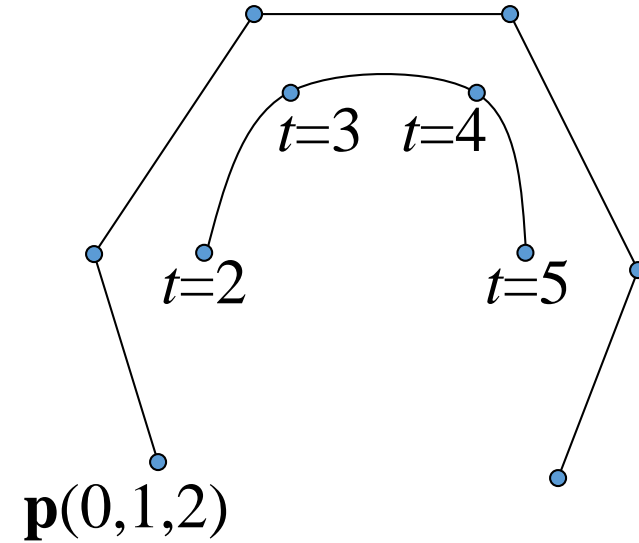


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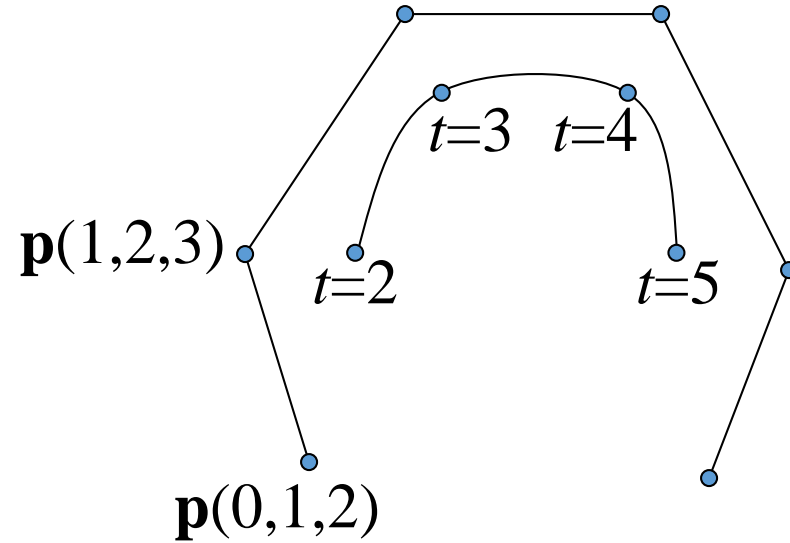


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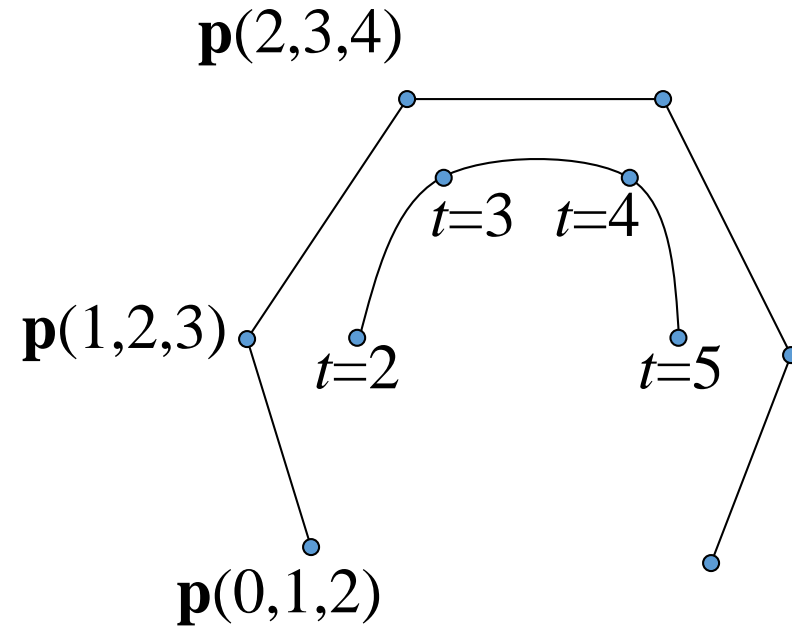


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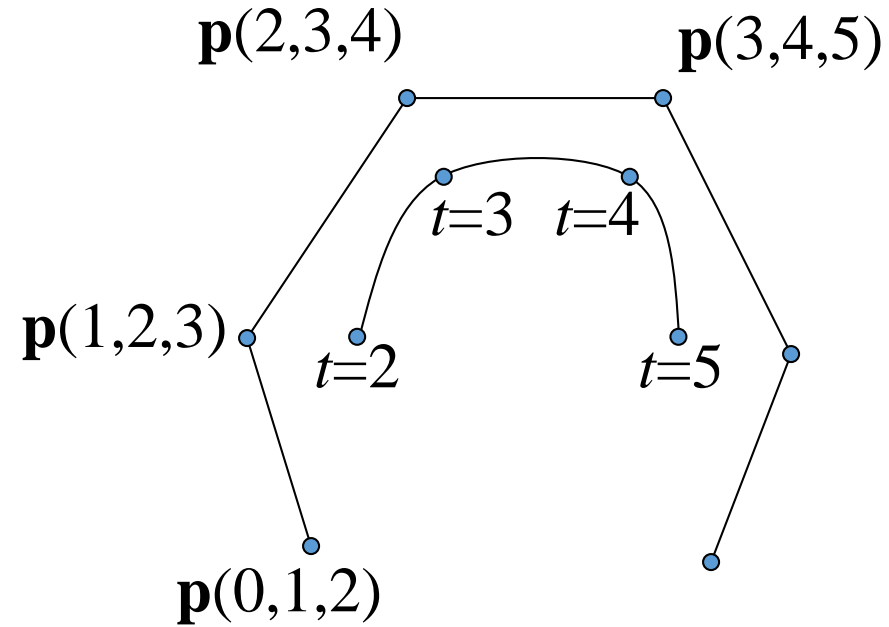


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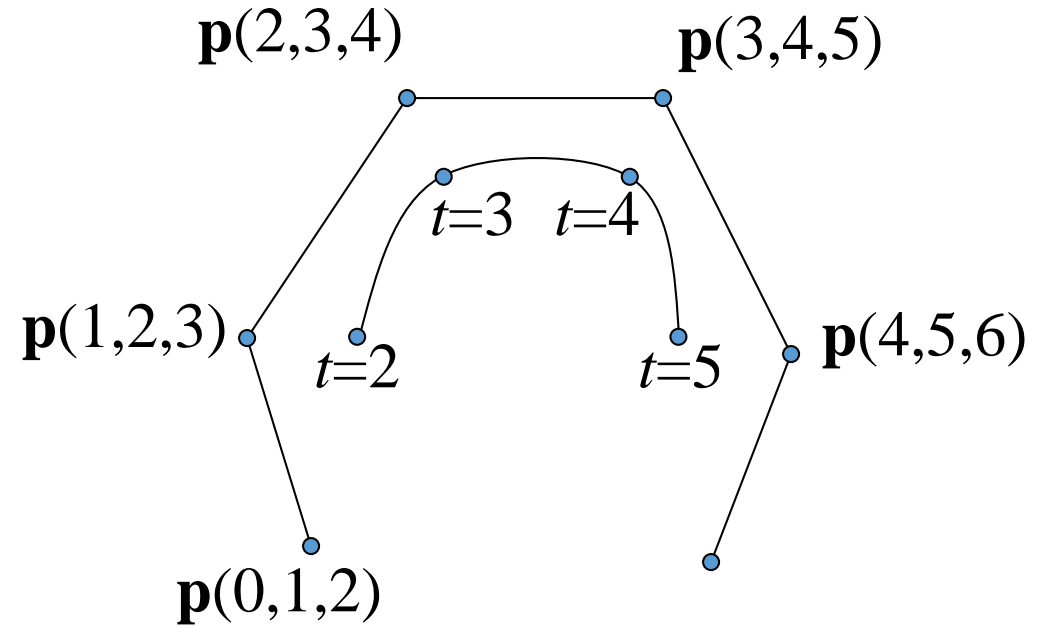


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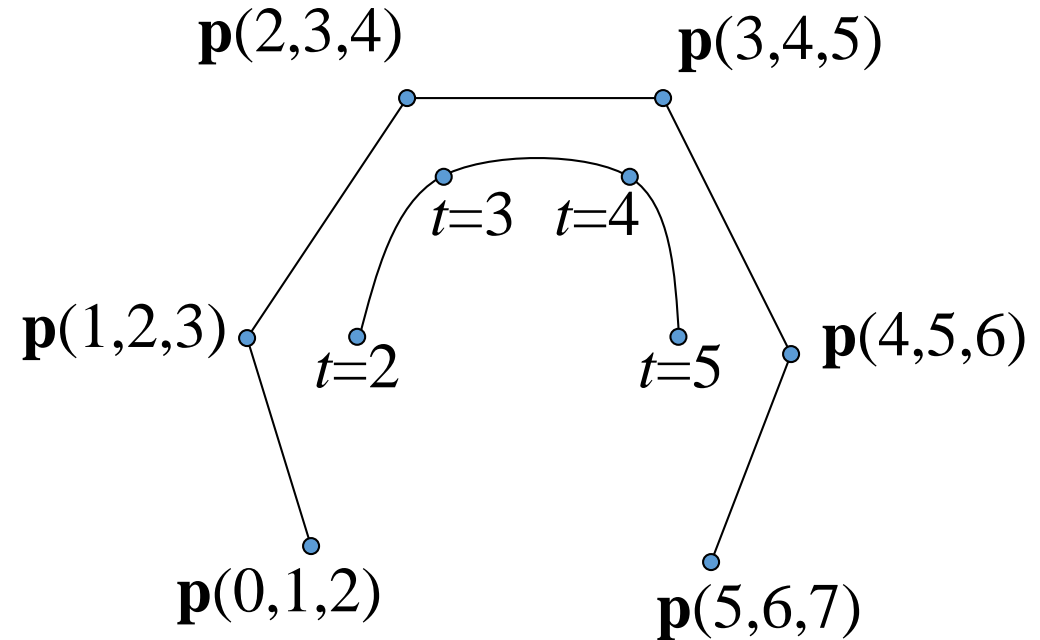


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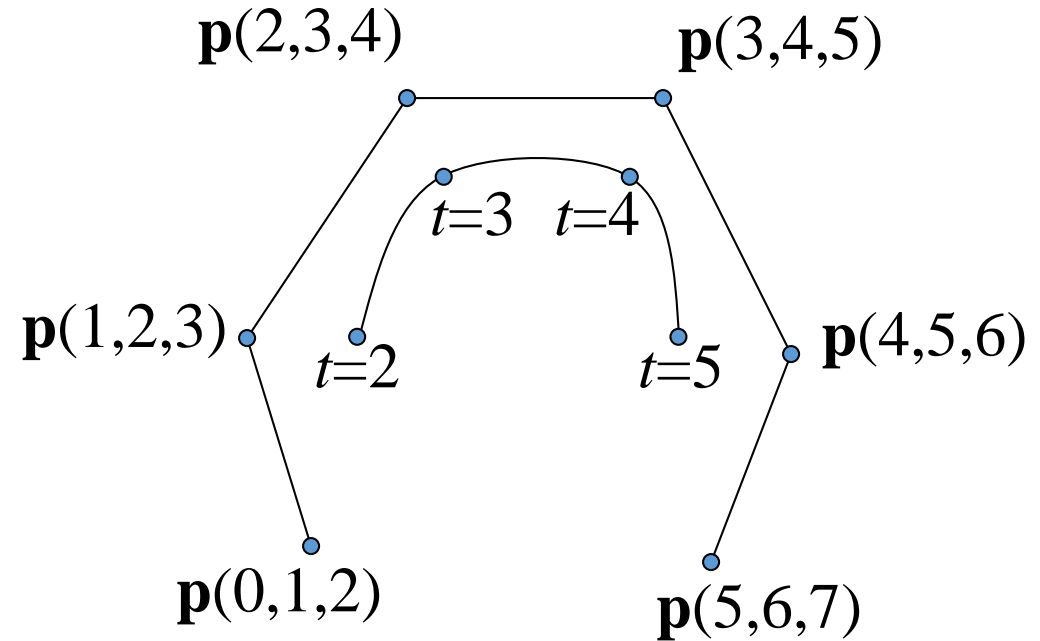


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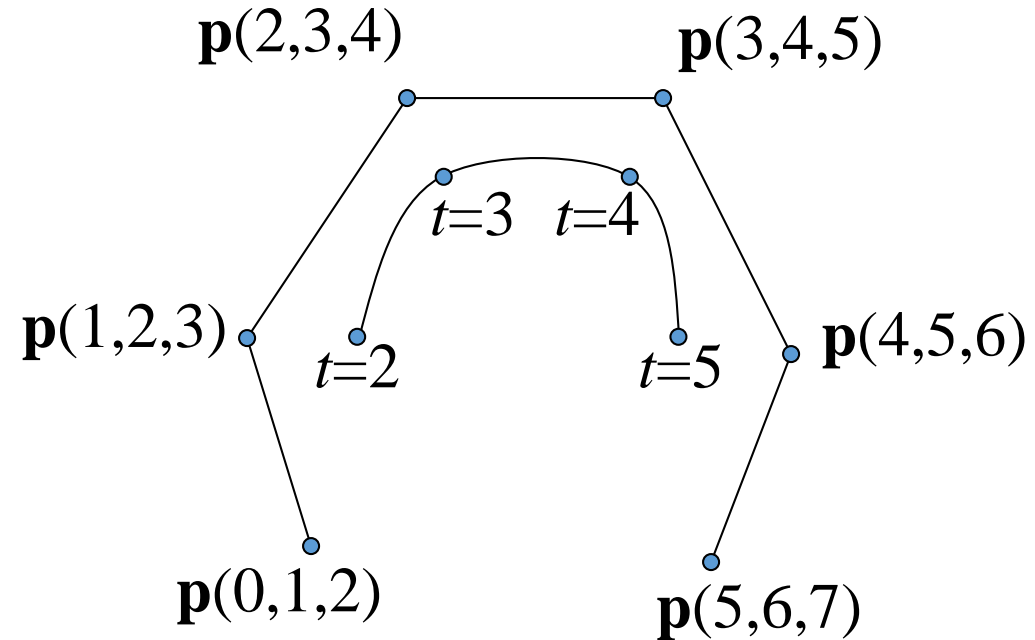
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Bohm Blossoms

B-Spline Rules for Winning the Game:

Convert a B-Spline to a Bezier Curve

- Bohm Algorithm
- Trick: Think of each segment as a Bezier curve



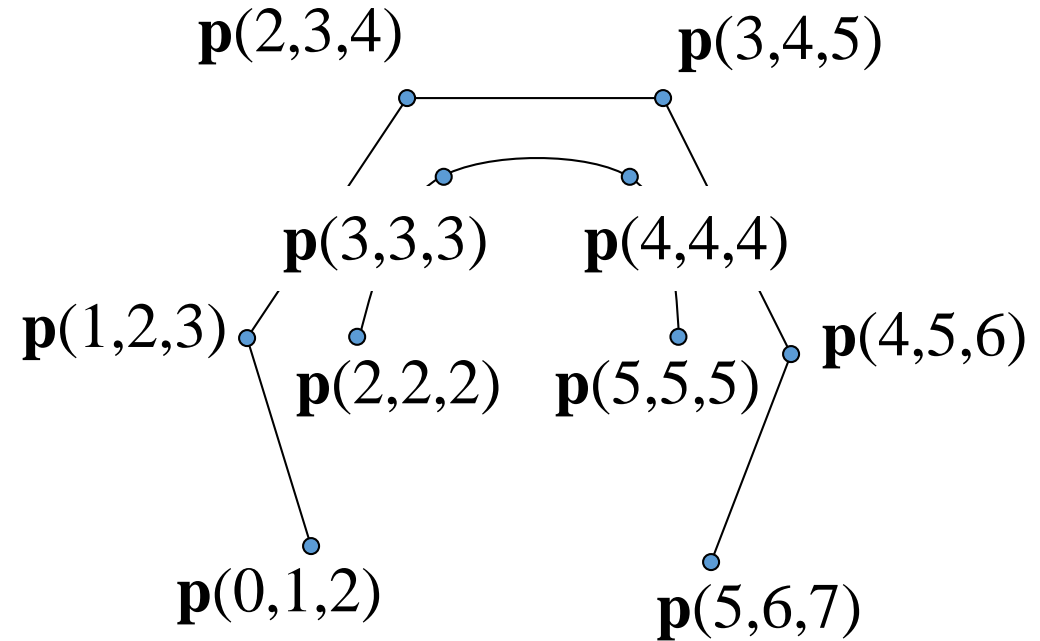
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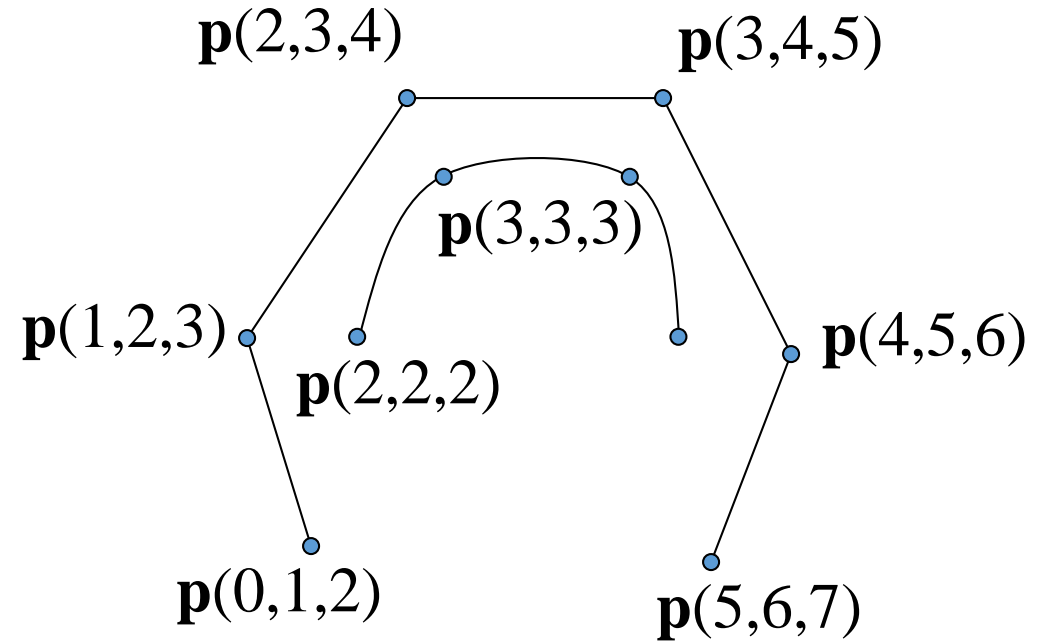
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- Where should the other two control points go for the [2,3] segment?



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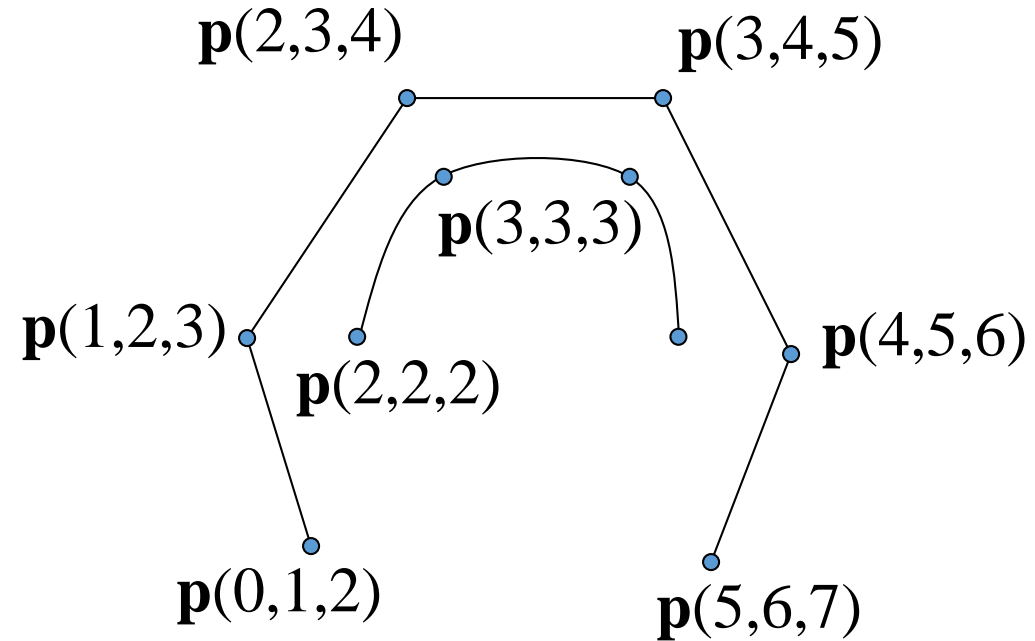
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- Need to find:

$\mathbf{p}(2,2,3)$

$\mathbf{p}(2,3,3)$



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Bohm Blossoms

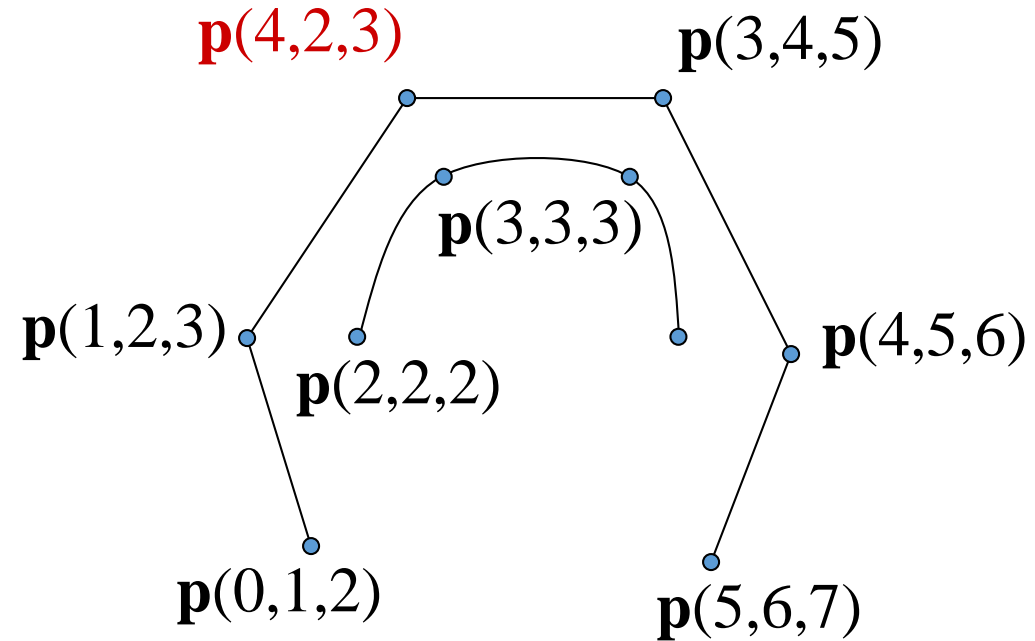
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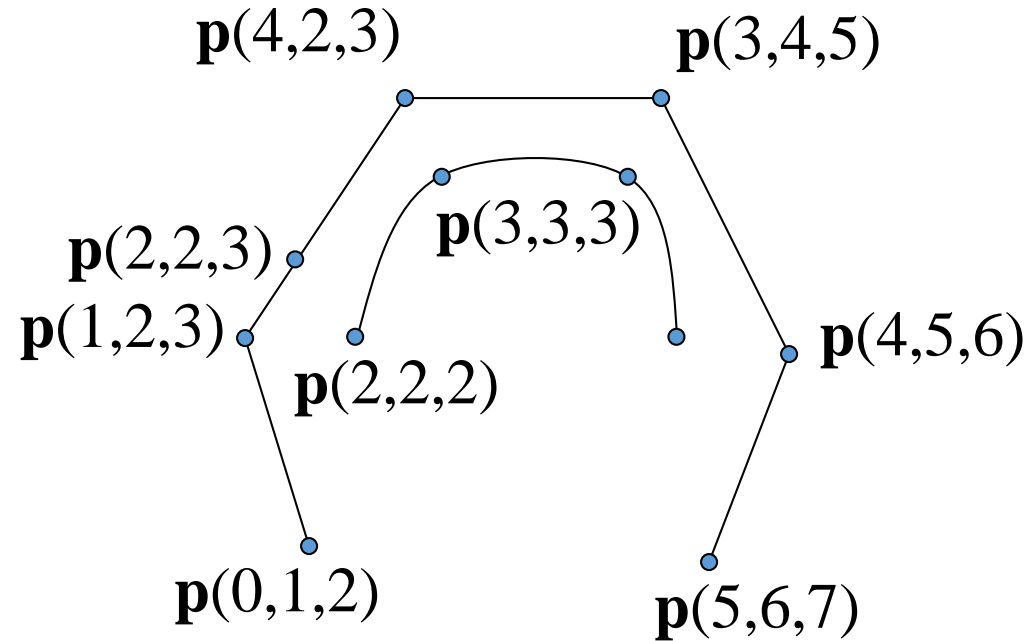
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- Need to find:

$$\mathbf{p}(2,2,3) = \frac{2}{3} \mathbf{p}(1,2,3) + \frac{1}{3} \mathbf{p}(4,2,3)$$

$$\mathbf{p}(2,3,3)$$



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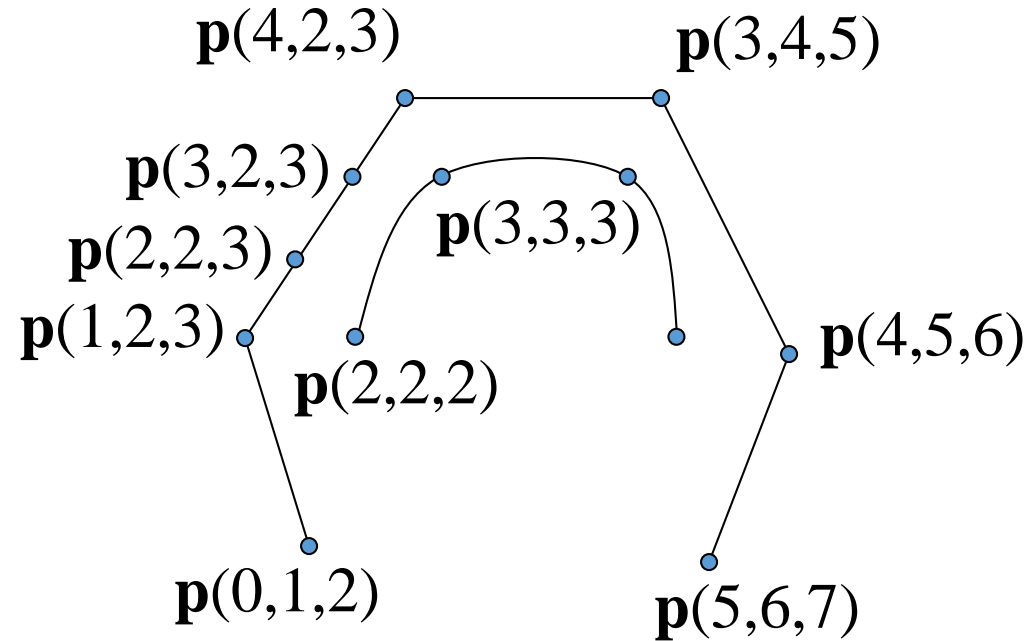
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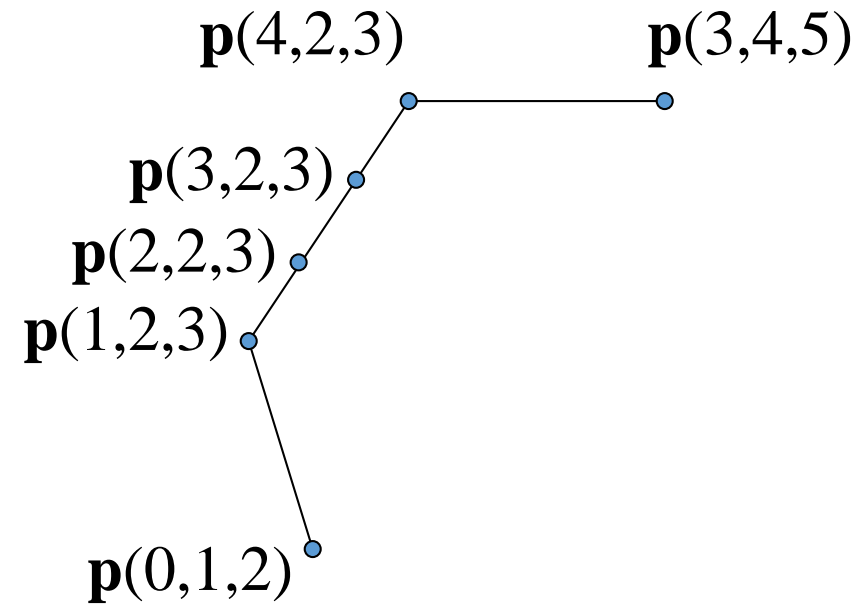
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- Where are the endpoints located?

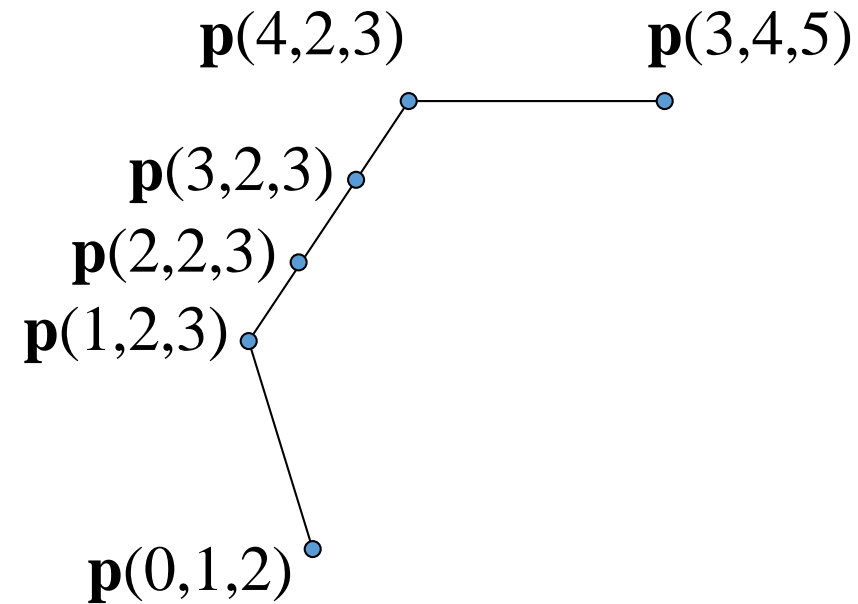


Bohm Blossoms

- Where are the endpoints located?
- Need to find:

$\mathbf{p}(2,2,2) =$

$\mathbf{p}(3,3,3) =$



Bohm Blossoms

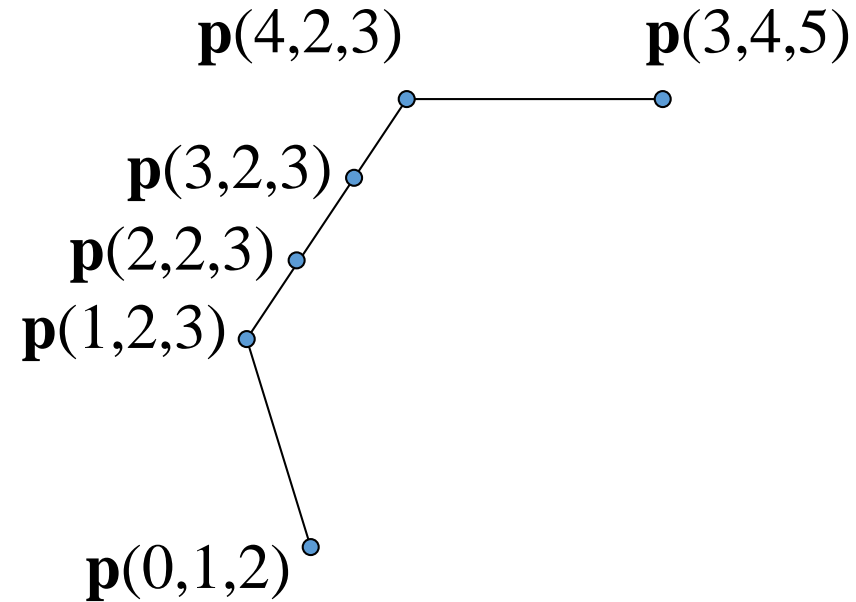
- Where are the endpoints located?
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$\mathbf{p}(2,1,2) =$

$\mathbf{p}(3,4,3) =$

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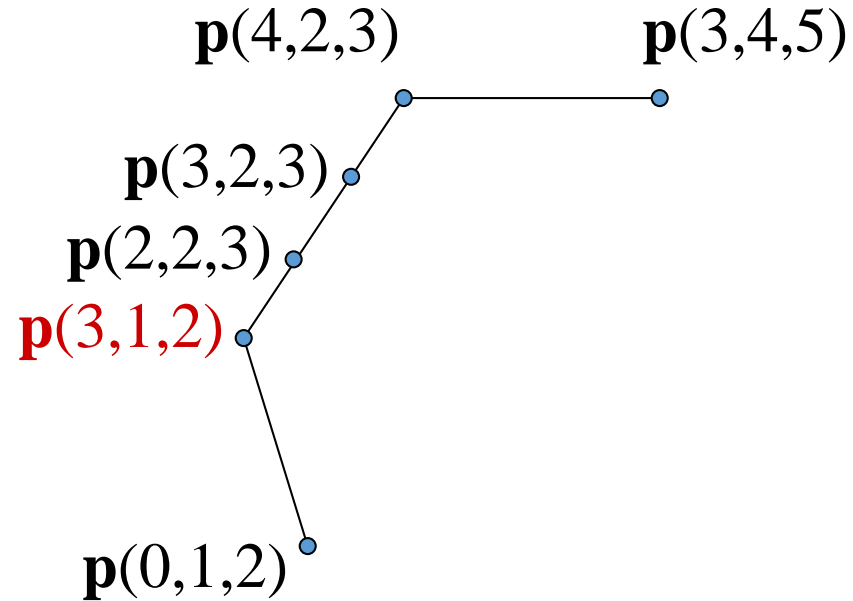
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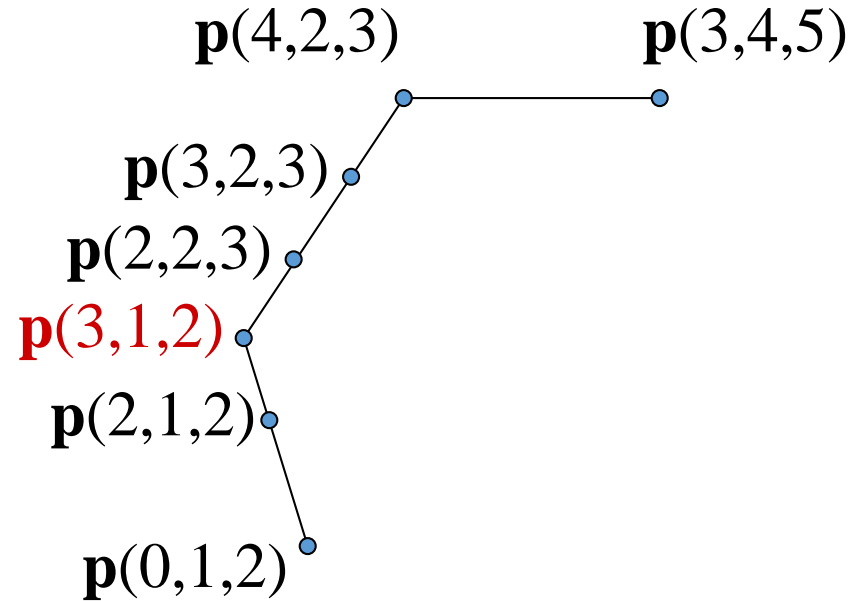
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$$\mathbf{p}(2,1,2) = 1/3 \mathbf{p}(0,1,2) + 2/3 \mathbf{p}(3,1,2)$$

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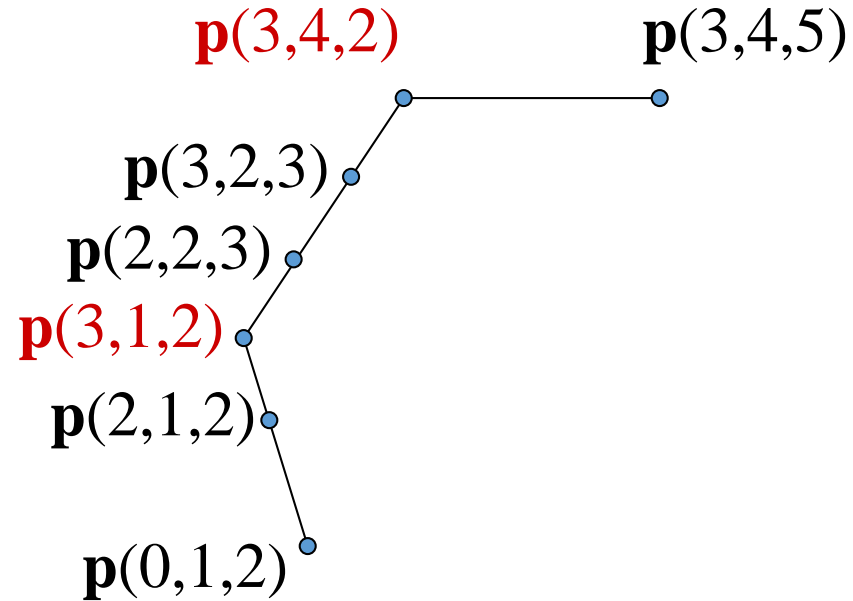
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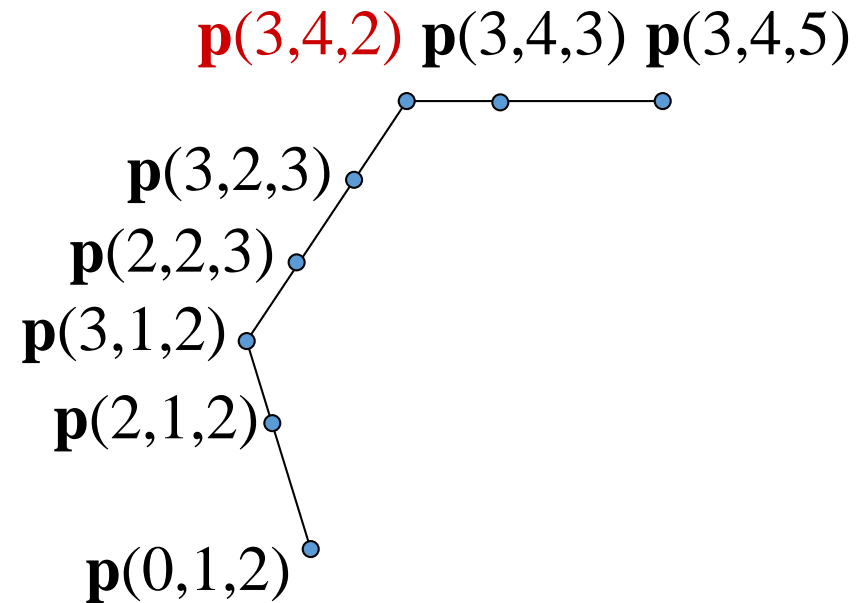
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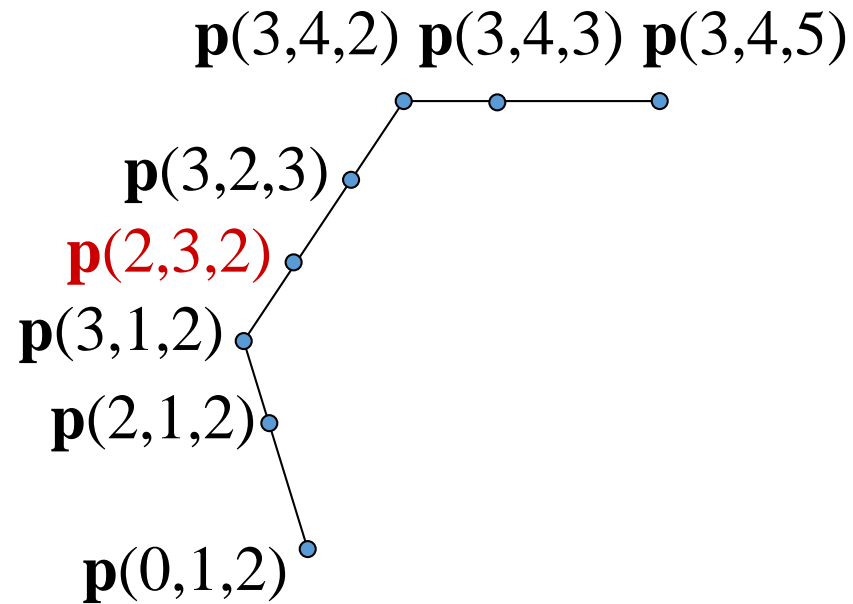
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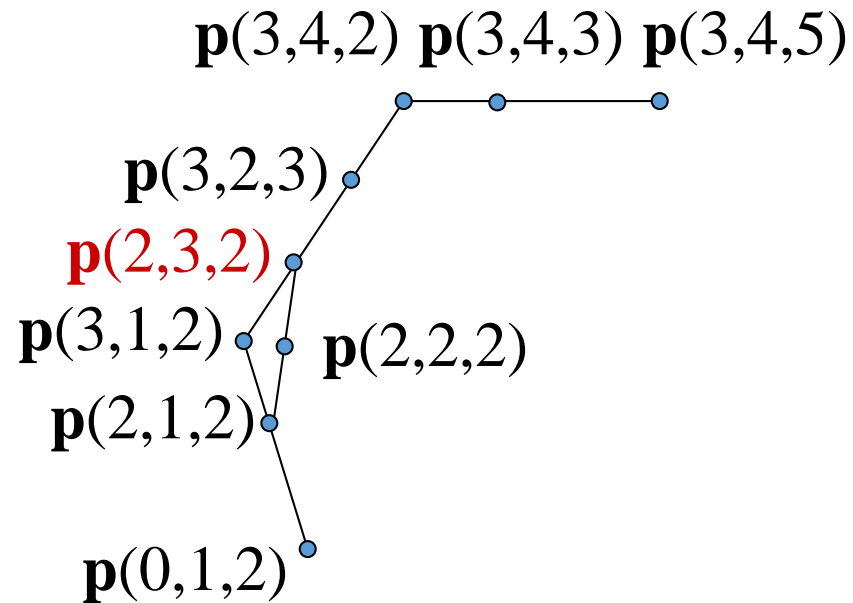
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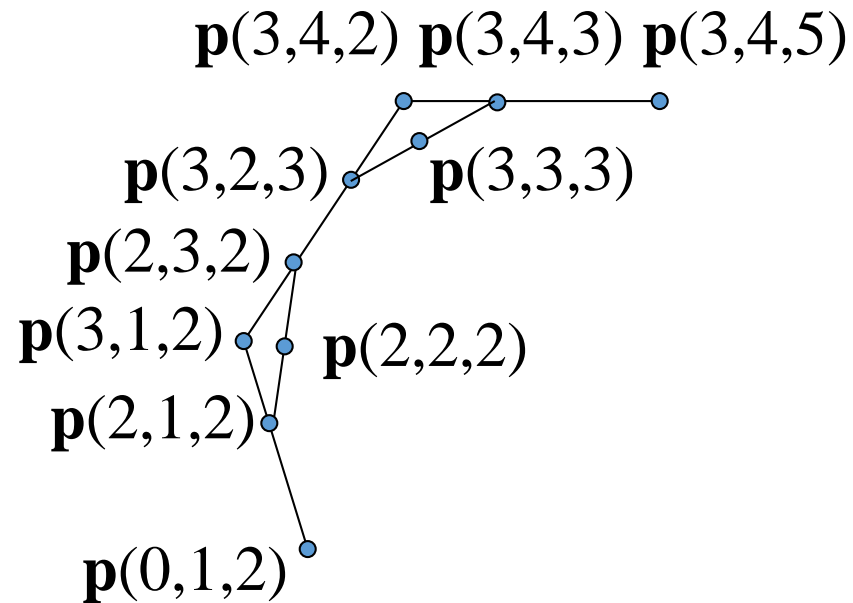
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