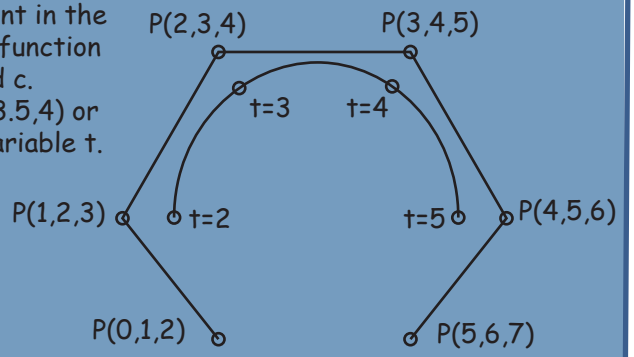
The Blossoming Game

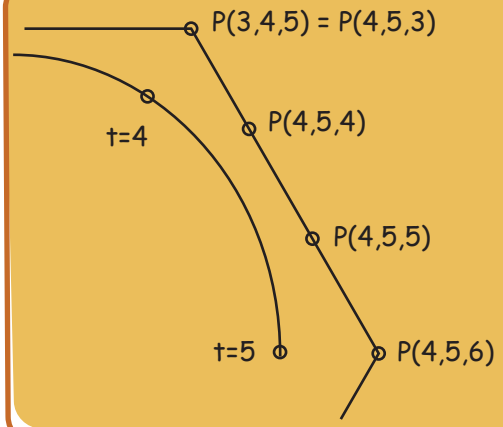
B-Spline Evaluation Rules

The Pieces. A blossom labels a point in the construction of a cubic curve with a function P(a,b,c) of three parameters a, b and c. Some sample blossoms might be P(1,3.5,4) or P(0,t,t) using the curve parameter variable t.

Setting Up the Board. For a cubic B-spline, the blossoms of the control points are labeled with consecutive triples from the knot vector. We don't need a control point to correspond with the first and last knot values.



knot vector: (0,1,2,3,4,5,6,7)



Order Doesn't Matter. A blossom can be rewritten with its parameters in any order, so P(a,b,c) = P(a,c,b) = P(b,a,c) = P(b,c,a) = P(c,a,b) = P(c,b,a).

Creating New Blossoms. If two blossoms share the same parameters except for one, then the blossom of a point on a line between them can be found by linearly interpolating this one parameter value (and setting the rest to the shared parameter values).

Winning the Game. The position P(t) on the NURBS curve at parameter value t can be found by finding the position of the blossom P(t,t,t) by repeatedly interpolating existing blossoms, starting with the control point blossoms, until a blossom is found with all parameters equal the desired curve parameter t.