

Bezier

A **Bezier Curve** is a 2-D Curve Approximation. The curve passes through first and last points and follows the trend of the others; it does not necessarily cross through all of the points in the data set.

The binomial coefficient $\text{Binomial}[n, m]$ can be written as $\binom{n}{m} = n! / [m! (n - m)!]$.

```
f[n_, t_, i_] := Binomial[n, i] t^i (1 - t)^(n - i)
```

```
n = 3;
```

```
fns = Table[f[n, t, i], {i, 0, n}]
```

```
{(1 - t)^3, 3 (1 - t)^2 t, 3 (1 - t) t^2, t^3}
```

Data set curve should follow:

```
knots = {{0, 0}, {1, 1}, {3, 2}, {4, 0}}
```

```
{{0, 0}, {1, 1}, {3, 2}, {4, 0}}
```

```
{xs, ys} = Transpose[knots]
```

```
{{0, 1, 3, 4}, {0, 1, 2, 0}}
```

The product of the coordinates selected and the binomial function above results in a 2-D curve!

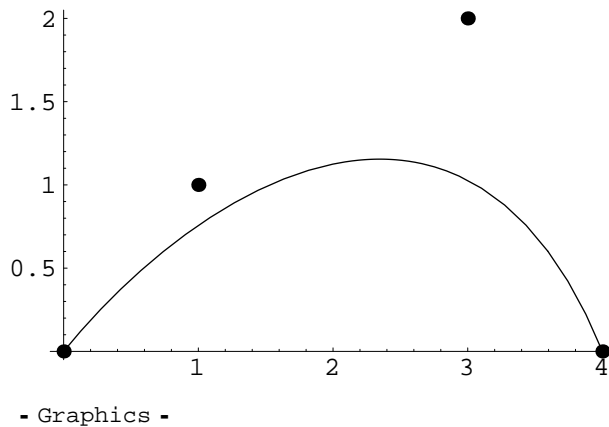
```
xyt = {xs.fns, ys.fns}
```

```
{3 (1 - t)^2 t + 9 (1 - t) t^2 + 4 t^3, 3 (1 - t)^2 t + 6 (1 - t) t^2}
```

```
c := ParametricPlot[Evaluate[xyt], {t, 0, 1}]
```

```
p := Graphics[{PointSize[.025], Map[Point, knots]}]
```

```
Show[c, p]
```



Notice that the curve goes through the end points and follows only the trend of the points in between.