Bézier paths

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Find endpoints for quadratic controls $(1, 2)$, $(4, 5)$, $(6, 1)$. [2 marks]

At $t = 0$ only the first weight remains.

At $t = 1$ only the last remains.

Answer: Start $(1, 2)$, end $(6, 1)$.

2. Find $B\left(\frac{1}{2}\right)$ for quadratic controls $(0, 0)$, $(2, 4)$, $(6, 0)$. [2 marks]

Use weights $\frac{1}{4}$, $\frac{1}{2}$, $\frac{1}{4}$.

The coordinates are $1 + 1.5$ and 2.

Answer: $(2.5, 2)$

3. Find endpoint derivatives for quadratic controls $(1, 1)$, $(2, 4)$, $(5, 2)$. [2 marks]

Compute twice each end control displacement.

$2(1, 3)$ and $2(3, -2)$.

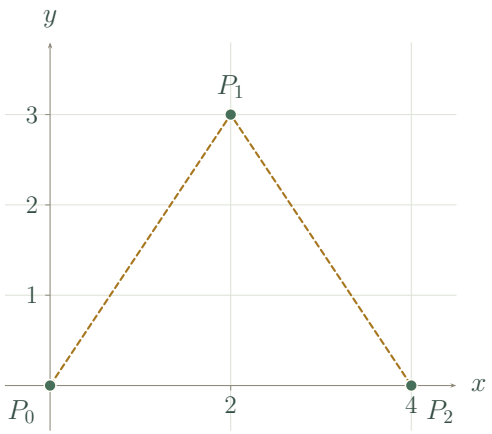
Answer: $(2, 6)$ and $(6, -4)$.

4. Expand the quadratic rule with controls $(0,0)$, $(2,3)$, $(4,0)$. [2 marks]

The x coordinate is $4t(1-t)+4t^2=4t$.

The y coordinate is $6t(1-t)$.

Answer: $\mathbf{B}=(4t,6t-6t^2)$.



5. For a cubic with $P_0=(0,0)$, $P_1=(2,0)$, find its initial derivative. [2 marks]

Use $3(P_1-P_0)$.

Multiply $(2,0)$ by 3.

Answer: $(6,0)$

6. Show quadratic Bézier weights sum to 1. [2 marks]

Expand every product.

All t terms cancel, leaving 1.

Answer: $(1-t)^2+2t(1-t)+t^2=1$.