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 (1/2) for quadratic controls (0, 0), (2, 4), (6, 0). [2 marks]

Use weights 1/4, 1/2, 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: 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: $(1-t)^2+2t(1-t)+t^2=1$.