A PARAMETRIC CURVE

Draw, using a graphing program, the curve given parametrically by

\[ x = t^2 + t, \quad y = 4at^3 + (3a + b)t^2 + bt \]

What curves can you get as you vary \( a \) and \( b \)?

What name would you give this curve?

Look at the curve.

Now how many times would you say \( \frac{dy}{dx} \) is zero?

Find these points exactly.

Something ‘funny’ happens at one point – what is the value of \( t \) here?

What point is this? Can the point ever be on the \( x \)-axis?

What happens if you take

\[ x = \text{quadratic in } t, \quad y = \text{cubic in } t \]

with a wider range of coefficients?

Can you make a loop?

Investigate \( \frac{dy}{dx} \) and \( \frac{d^2y}{dx^2} \) for these new curves.

Go to page 45 for Jonny’s solution.

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