Introduction to Differential Equations

Starter

1. **(Review of AS material)**

    A curve passes through the point $(2, -5)$ and satisfies $\dfrac{dy}{dx} = 6x^2 - 1$. Find $f(x)$.

2. **(Review of AS material)**

    Given that the gradient function of $f(x)$ is $15x^2 - 6x + 4$ and $f(1) = 0$, find $f(x)$.

Notes

From the starter questions, it can be seen that we have already solved differential equations when we were finding the value of the constant, c, in AS maths.

General solution vs. particular solution

General solution: find $y = f(x) + c$

In the example above $y = 2x^3 - x + c$ is the ***general solution***

Particular solution: find the particular value for c so that y is a function without unknowns

In the example above $y = 2x^3 - x - 19$ is the ***particular solution***

E.g. 1 Find the general solution of the differential equation $\dfrac{dy}{dx} = \sin 3x - e^{6x} + \sec^2 x$.

E.g. 2 Find the particular solution of the differential equation $\dfrac{dy}{dx} = \sqrt{5x + 1}$ given that when $x = 7, y = 8$.

Video: Finding the constant term

Solutions to Starter and E.g.s

Exercise

p284 13A Qu 1i, 2i

Summary

The ***general solution*** includes the constant of integration, c.

The ***particular solution*** has "c" replaced by its actual value (calculated from a given boundary condition).