8.3 Initial Value Problems

Wednesday, June 12, 2019 7:14 AM

Steps

1. Calculate the antiderivative
2. Plug in given x and y values to solve for C
3. Rewrite y= equation with C-value
4. Repeat this process if you were given the second derivative $\frac{d^2y}{dx^2}$

ex

$\frac{dy}{dx} = 6x^2 - 8x + 3$ $y = 4$ when $x = -1$

① $y = 2x^3 - 4x^2 + 3x + C$

② $4 = 2(-1)^3 - 4(-1)^2 + 3(-1) + C$

$4 = -2 - 4 - 3 + C$

$4 = -9 + C$

$+9 \quad +9$

$13 = C$

③ $y = 2x^3 - 4x^2 + 3x + 13$

ex

$\frac{d^2y}{dx^2} = 12x - 8$ $\frac{dy}{dx} = 5$ $y = -1$ when $x = 2$

① $\frac{dy}{dx} = 6x^2 - 8x + C$

② $5 = 6(2)^2 - 8(2) + C$

$5 = 24 - 16 + C$

$-3 = C$

③ $\frac{dy}{dx} = 6x^2 - 8x - 3$

④ $y = 2x^3 - 4x^2 - 3x + C$

⑤ $-1 = 2(2)^3 - 4(2)^2 - 3(2) + C$

$-1 = 16 - 16 - 6 + C$

$5 = C$

ex

$a = -16$ (second derivative) $V = 4$ $S = 15$ when $t = 1$

① $V = -16t + C$

② $4 = -16(1) + C$

$20 = C$

③ $V = -16t + 20$ (first derivative)

④ $S = -8t^2 + 20t + C$

⑤ $15 = -8(1)^2 + 20(1) + C$

$15 = -8 + 20 + C$

$3 = C$

$-1 = 16 - 16 - 6 + C$

$5 = C$

⑥ $y = 2x^3 - 4x^2 - 3x + 5$

$3 = C$

⑥ $s = -8t^2 + 20t + 3$