12/2 §3-9 Application of antiderivative

Ex3 Find f if

$f'(x) = x\sqrt{x}$ and $f(1)=2$

differential Equation + initial condition

Initial Value Problem. (*)

$f'(x) = x^{\frac{3}{2}}$ by power rule for integration

$f(x) = \frac{x^{\frac{3}{2}+1}}{\frac{3}{2}+1} + C = \frac{2}{5}x^{\frac{5}{2}} + C$

$2 = \frac{2}{5}\cdot 1 + C \quad \therefore C = \frac{8}{5}$

The solution of (*) is $f(x) = \frac{2}{5}x^{\frac{5}{2}} + \frac{8}{5}$

Ex 4 find f if

$$f'' = 12x^2 + 6x - 4$$
$$f(0) = 4$$
$$f(1) = 1$$

$$f'(x) = 12 \cdot \frac{x^{2+1}}{3} + 6 \cdot \frac{x^{1+1}}{2} - 4x + C_1$$
$$= 4x^3 + 3x^2 - 4x + C_1$$

$$f(x) = 4 \cdot \frac{x^{3+1}}{4} + 3 \cdot \frac{x^{2+1}}{3} - 4 \cdot \frac{x^{1+1}}{2} + C_1 x + C_2$$
$$= x^4 + x^3 - 2x^2 + C_1 x + C_2$$

$$f(0) = 4 = C_2$$

$$f(1) = 1 = 1 + 1 - 2 + C_1 + 4$$

$$C_1 = -3$$

So $f(x) = x^4 + x^3 - 2x^2 - 3x + 4$ ✱

Exercise (in Group)

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Chap 4-1 Definite integral

(on the board)