4.8 - Antiderivatives / differential eq.

$F'(x) = f(x)$

F = antiderivative of F

general antiderivative

$F(x) + C$

Think: Whose derivative is this??

Diff. eq. → looking for a solution to an eq. that is a function
take the antiderivative

Rectilinear Motion → $s(t) \xrightarrow{dx} v(t) \xrightarrow{dx} a(t)$
position ← antidx velocity ← antidx acceleration

Find the antiderivative (General form)

10) $\frac{1}{2} \longrightarrow \frac{1}{2}x + C$

12) $x \longrightarrow \frac{1}{2}x^2 + C$

14) $x^{5/2} + 2 \longrightarrow \frac{2}{7}x^{7/2} + 2x + C$

16) $3x^{-3} \longrightarrow -\frac{3}{2}x^{-2} + C$

18) $\frac{1}{\sqrt{x}} = x^{-1/2} \longrightarrow 2x^{1/2} + C$

20) $x^2 - x \longrightarrow \frac{1}{3}x^3 - \frac{1}{2}x^2 + C$

22) $(3x-1)^2 \longrightarrow (3x-1)^3 + C$

24) $\frac{4x^{3/2} - 1}{x} = 4x^{1/2} - \frac{1}{x} \longrightarrow \frac{8}{3}x^{3/2} - \ln(x)$

Solve for the particular solution of the diff eq w/ boundry problem

$s'(t) = t^4 + 4t^3 - 5 \qquad s(2) = 5$

$s(t) = \frac{1}{5}t^5 + t^4 - 5t + C$

$5 = \frac{1}{5}(2)^5 + 2^4 - 5(2) + C$

$C = 5 - \frac{62}{5}$

$s(t) = \frac{1}{5}t^5 + t^4 - 5t - 5 - \frac{62}{5}$