MATH 122

GOALS

- ☐ REWRITE ALL OF OUR FAMILIAR DERIVATIVE RULES AS ANTIDERIVATIVES
- ☐ COMBINE ANTIDERIVATIVE RULES
- ☐ UNDERSTAND AND SOLVE INITIAL VALUE PROBLES

$$\int f(x)dx =$$

POWER RULE:

DERIVATIVE	ANTIDERIVATIVE

EXAMPLES

① $\int x^4 \, dx =$

② $\int \sqrt[3]{x} \, dx =$

③ $\int \frac{1}{x^5}\,dx =$

How about $\frac{1}{x}$?

$$\int \frac{1}{x}\,dx =$$

e.g. $\int_1^2 \frac{1}{x}\,dx =$

$\int_{-2}^{-1} \frac{1}{x}\,dx =$

EXPONENTIALS:

$$\int e^x\,dx =$$

SINCE $\frac{d}{dx}\left(b^x\right) =$, $\int b^x\,dx =$

TRIG:

$\frac{d}{dx}(\sin x) =$

$\frac{d}{dx}(\cos x) =$

$\frac{d}{dx}(\tan x) =$

$\frac{d}{dx}(\cot x) =$

$\frac{d}{dx}(\sec x) =$

$\frac{d}{dx}(\csc x) =$

INV. TRIG:

$$\int \frac{1}{\sqrt{1-x^2}}\,dx =$$

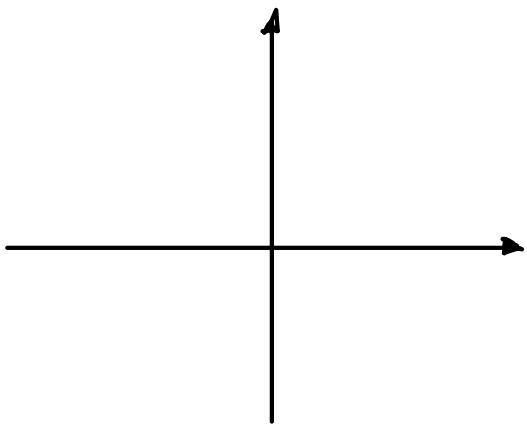
$$\int \frac{1}{1+x^2}\,dx =$$

Ex: $\int x^3 + 2\sin x - 4 \, dx =$

Ex: $\int \frac{x^2 + 1}{x} \, dx =$

INITIAL VALUE PROBLEMS: IF WE HAVE A y-VALUE, WE CAN SOLVE FOR C AFTER INTEGRATING.

IF ALL WE KNOW IS $\frac{dy}{dx} = 2x$, THE BEST WE CAN DO IS...



Ex: I.V.P. $\begin{cases} \frac{dy}{dx} = 2x \\ y(1) = 3 \end{cases}$

Ex:

$$\begin{cases} \frac{d^2y}{dx^2} = -10 \\ y'(0) = 4 \\ y(0) = -3 \end{cases}$$