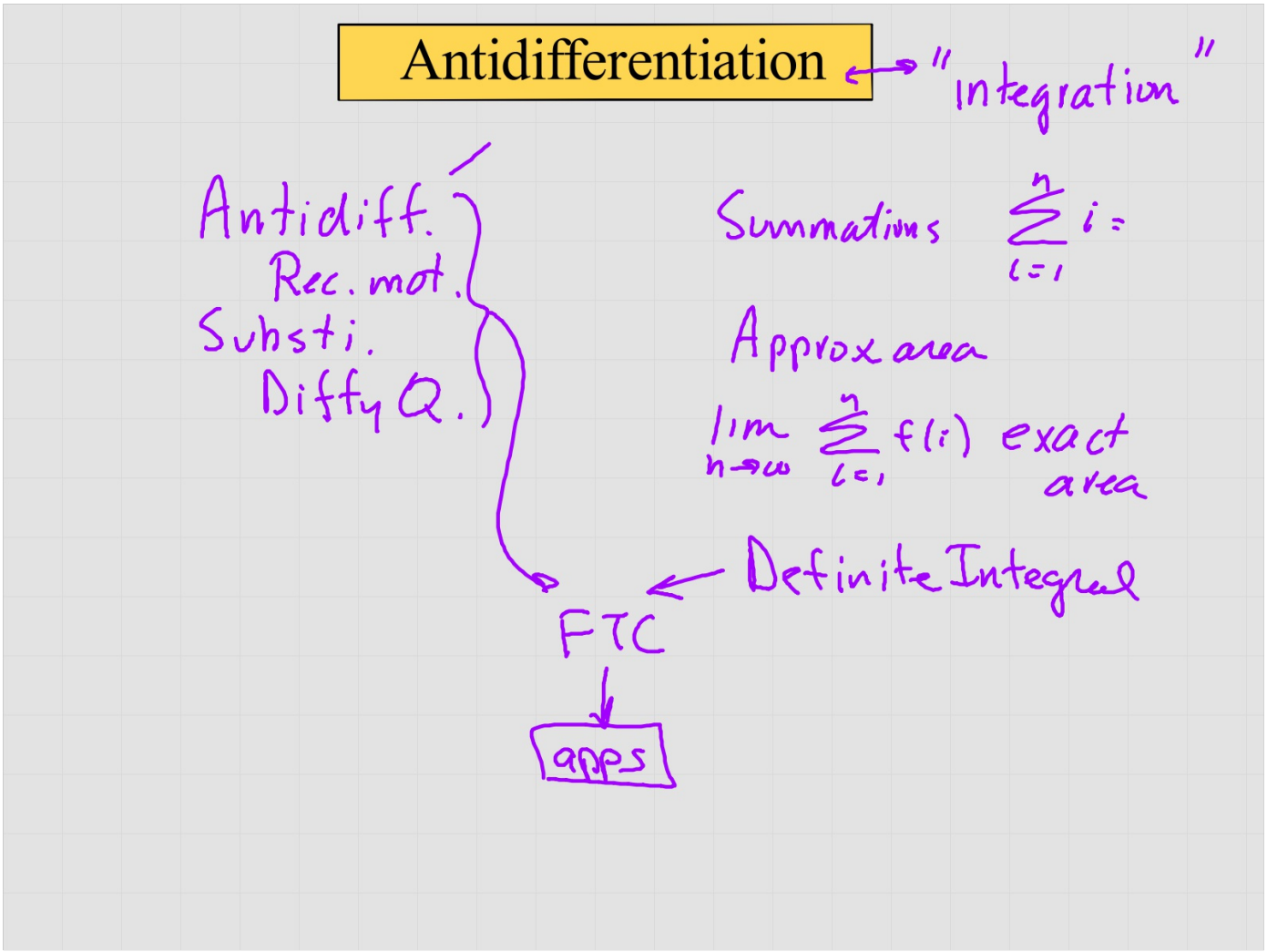

Antidifferentiation
"integration"
Antidiff.
Rec. mot.
Substi.
Diffy Q.
Summations $\sum_{i=1}^{n} i =$
Approx area
$\lim_{n\to\infty} \sum_{i=1}^{n} f(i)$ exact area
Definite Integral
FTC
apps

$$f'(x) = 8x - 3$$

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

$$\int (8x - 3)\,dx = 4x^2 - 3x + C.$$

$$\int \sqrt{x}\left(2x^3-7x+1\right)dx$$

$$=\int x^{1/2}\left(2x^3-7x+1\right)dx$$

$$=\int \left(2x^{5/2}-7x^{3/2}+x^{1/2}\right)dx$$

$$=2\cdot\frac{2}{7}x^{7/2}-7\cdot\frac{2}{5}x^{5/2}+\frac{2}{3}x^{3/2}+C$$

$$=\frac{4}{7}\sqrt{x^7}-\frac{14}{5}\sqrt{x^5}+\frac{2}{3}\sqrt{x^3}+C$$

$$\int x^{-1}\,dx = \frac{x^0}{0} + \dots \quad \text{nope.}$$

$$\int \frac{1}{x}\,dx = \ln|x| + C$$

Power Rule for Antiderivatives

$$\int u^n\,du = \begin{cases} \dfrac{u^{n+1}}{n+1} + C & n \neq -1 \\ \ln|u| + C & n = -1 \end{cases}$$

$$\int \frac{x^2+5x}{x^3}\,dx$$

$$= \int \left(\frac{1}{x} + 5x^{-2}\right) dx$$

$$= \ln|x| + (5)\frac{x^{-1}}{-1} + C$$

$$= \ln|x| - \frac{5}{x} + C.$$

"$+C$" → general sol.

Given $f'(x) = 12x^2 - 24x + 1$ and $f(1) = -2$, find $f(x)$.

$f(1) = -2$ ↳ initial cond.

$f(x) = 4x^3 - 12x^2 + x + C$

$-2 = 4 - 12 + 1 + C$

$5 = C$

$\therefore f(x) = 4x^3 - 12x^2 + x + 5$ ← particular soln.

$f''(x) = 3x - 7$ find $f(x)$ and $f'(1) = 2$ and $f(1) = 3$

$$f'(x) = \frac{3}{2}x^2 - 7x + C$$

$$f(x) = \frac{1}{2}x^3 - \frac{7}{2}x^2 + Cx + D$$

At any pt (x,y) on a curve the slope of a tang to the curve is given by $4x-5$. If curve contains $(3,7)$ find eq. of the curve.

$f'(x) = 4x - 5$

$f(x) = 2x^2 - 5x + C$ — gen. soln

$7 = 18 - 15 + C$

$4 = C$

$\therefore f(x) = 2x^2 - 5x + 4$ — part. soln.

$$\int \cos u \, du = \sin u + C$$

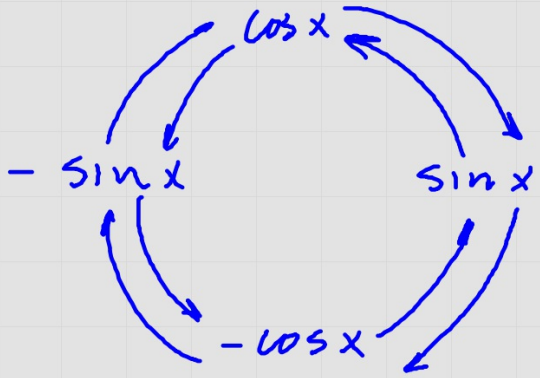
$$\int \sin u \, du = -\cos u + C$$

$$\int \sec u \tan u \, du = \sec u + C$$

$$\int \csc u \cot u \, du = -\csc u + C$$

$$\int \sec^2 u \, du = \tan u + C$$

$$\int \csc^2 du \, du = -\cot u + C$$


cos x
sin x
−cos x
−sin x