Notes: Fundamental Theorem of Calculus (Part I) Integration Day 5

$\frac{d}{dx}\left[x^n\right]=$	$\int x^n\,dx=$
$\frac{d}{dx}\left[e^x\right]=$	$\int e^x\,dx=$
$\frac{d}{dx}[\ln x]=$	$\int \frac{1}{x}\,dx=$
$\frac{d}{dx}[\sin x]=$	$\int \cos x\,dx=$
$\frac{d}{dx}[\cos x]=$	$\int \sin x\,dx=$
$\frac{d}{dx}[\tan x]=$	$\int \sec^2 x\,dx=$
$\frac{d}{dx}[\cot x]=$	$\int \csc^2 x\,dx=$
$\frac{d}{dx}[\sec x]=$	$\int \sec x \tan x\,dx=$
$\frac{d}{dx}[\csc x]=$	$\int \csc x \cot dx=$
$\frac{d}{dx}\left[\tan^{-1} x\right]=$	$\int \frac{1}{1+x^2}\,dx=$
$\frac{d}{dx}\left[\sin^{-1} x\right]=$	$\int \frac{1}{\sqrt{1-x^2}}\,dx=$

■ Indefinite Integrals

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

<u>Fundamental Theorem of Calculus (Part I)</u>

Assume that $f(x)$ is continuous on $[a,b]$ and let $F(x)$ be the antiderivative of $f(x)$ on $[a,b]$.

Then $\int_a^b f(x)\,dx = F(b) - F(a)$

■ Definite Integrals

$\int_a^b f(x)\,dx =$ __________________

Example One: Calculate the area under the graph:

A. $f(x) = x^3$ $[2,4]$

Same as $\int_2^4 x^3 dx$

B. $g(x) = x^{-\frac{3}{4}} + 3x^{\frac{5}{3}}$ $[1,3]$

Same as $\int_1^3 x^{-\frac{3}{4}} + 3x^{\frac{5}{3}}\ dx$

C. $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} sec^2\, x \;\; dx$

D. $\int_0^{\pi} sinx\, dx$ and $\int_0^{2\pi} sinx\, dx$

E. $\int_{-2}^{1} e^x dx$

F. $\int_2^8 \frac{dx}{x}$

G. $\int_0^1 2x + \frac{3}{1+x^2}\; dx$

H. $\int_0^1 (3x-2)(x+5)\,dx$