Week 1 Monday

September 30, 2018 4:07 PM

D2L — Grades and Coursepack

www.leahhoward.com — Videos, Lecture Notes

Math 193

1. Integration (Theory)
2. Differential Equations (Applications)
   e.g. spring-mass systems
3. Statistics (Applications)

28.1 General Power Formula

RECAP

$f(x)$	$f'(x)$
x^{-2}	$-2x^{-3}$
$x^{4/3}$	$\frac{4}{3}x^{1/3}$
$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\tan x$	$\sec^2 x$
$\sec x$	$\sec x \tan x$
$\csc x$	$-\csc x \cot x$
$\cot x$	$-\csc^2 x$
$\sin^{-1} x$	$\frac{1}{\quad}$

$\int \sec^2 x\,dx = \tan x + C$

$\int \csc x \cot x\,dx = -\csc x + C$

$\sin^{-1}x$	$\frac{1}{\sqrt{1-x^2}}$
$\cos^{-1}x$	$\frac{-1}{\sqrt{1-x^2}}$
$\tan^{-1}x$	$\frac{1}{1+x^2}$
$\ln(2x+1)$	$\frac{1}{2x+1}\cdot 2$
$\ln g(x)$	$\frac{1}{g(x)}\cdot g'(x)$
e^{7x}	$7\cdot e^{7x}$
$e^{h(x)}$	$h'(x)\cdot e^{h(x)}$

Suggestion: Make flashcards

$$\int u^n du = \frac{u^{n+1}}{n+1} + C \qquad (n \neq -1)$$

Quick Ex: a) $\int u^{-3} du = \frac{u^{-2}}{-2} + C$

b) $\int u^{2/3} du = \frac{3}{5} u^{5/3} + C$

Ex: $\int \sqrt{\sin x}\cos x\,dx$

$u = \sin x$

$du = \cos x\,dx$

$$= \int \sqrt{u}\, du$$

$$= \int u^{1/2}\, du$$

$$= \frac{2}{3} u^{3/2} + C$$

$$= \frac{2}{3} (\sin x)^{3/2} + C \quad \text{or} \quad \frac{2}{3} \sin^{3/2} x + C$$

Note: Can't integrate $\int \sqrt{\sin x}\, dx$

Ex: Evaluate $\int_0^{\pi/16} \sin 4x \cos 4x\, dx$

$u = \sin 4x$

$du = 4 \cos 4x\, dx$

$\frac{du}{4} = \cos 4x\, dx$

when $x = 0$, $u = \sin 0 = 0$

$x = \frac{\pi}{16}$, $u = \sin \frac{4\pi}{16}$

$= \sin \frac{\pi}{4}$

$= \frac{1}{\sqrt{2}}$

$$= \int_0^{\frac{1}{\sqrt{2}}} \frac{u\, du}{4}$$

$$= \frac{1}{4} \int_0^{\frac{1}{\sqrt{2}}} u\, du$$

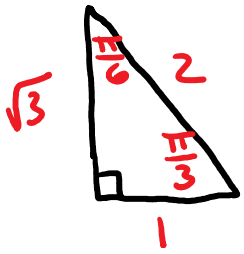
$$= \frac{1}{4} \left[\frac{u^2}{2} \right]_0^{\frac{1}{\sqrt{2}}}$$ No +C

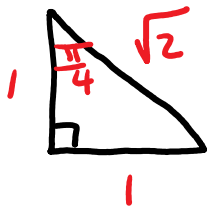
$$= \frac{1}{4} \left[\frac{1}{2} \left(\frac{1}{\sqrt{2}} \right)^2 - 0 \right]$$

$$= \frac{1}{4} \cdot \frac{1}{4}$$

$= \frac{1}{16}$

RECAP





SoHCAHToA

$$\tan\frac{\pi}{3} = \frac{O}{A} = \frac{\sqrt{3}}{1} = \sqrt{3}$$

$$\sec\frac{\pi}{4} = \frac{H}{A} = \frac{\sqrt{2}}{1} = \sqrt{2}$$

$\sin\pi = 0$ (y-value)

$\cos\pi = -1$ (x-value)