MATH 250/GRACEY NAME_____
WORKSHEET/4.1

DIFFERENTIATION FORMULA	INTEGRATION FORMULA
$\frac{d}{dx}[C]=0$	$\int 0dx=C$
$\frac{d}{dx}[kx]=k$	$\int kdx=kx+C$
$\frac{d}{dx}[kf(x)]=kf'(x)$	$\int kf(x)dx=k\int f(x)dx+C$
$\frac{d}{dx}[f(x)\pm g(x)]=f'(x)\pm g'(x)$	$\int[f(x)\pm g(x)]dx=\int f(x)dx\pm\int g(x)dx+C$
$\frac{d}{dx}[x^n]=nx^{n-1}$	$\int x^n dx=\frac{x^{n+1}}{n+1}+C,\ n\neq -1$
$\frac{d}{dx}[\sin x]=\cos x$	$\int \cos x dx=\sin x+C$
$\frac{d}{dx}[\cos x]=-\sin x$	$\int \sin x dx=-\cos x+C$
$\frac{d}{dx}[\tan x]=\sec^2 x$	$\int \sec^2 x dx=\tan x+C$
$\frac{d}{dx}[\sec x]=\sec x\tan x$	$\int \sec x\tan x dx=\sec x+C$
$\frac{d}{dx}[\cot x]=-\csc^2 x$	$\int \csc^2 x dx=-\cot x+C$
$\frac{d}{dx}[\csc x]=-\csc x\cot x$	$\int \csc x\cot x dx=-\csc x+C$

1. Fix the error(s) in the following antiderivatives. Hint: Find the derivative of the result.

   a. $\int x^5 dx=x^6+C$

b. $\int 3\sin x dx = 3\cos x + C$

c. $\int \sqrt{x} dx = 2x^{-1/2} + C$

2. Evaluate the following integrals.

a. $\int \frac{4x^2 - 3x + \sqrt[3]{x}}{2x^4} dx$

b. $\int \frac{\sec x \tan x}{2} dx$

c. $\int dx$

d. $\int \left(\sec^2 x - \frac{2}{x^5} - \csc x \cot x \right) dx$

3. Solve the differential equation.

$$y' = 2\cos x - 5x^9$$