INTEGRAL REVIEW

Evaluate:

a) $\int \sin x \, dx$

$= -\cos x + C$

b) $\int \cos x \, dx$

$= \sin x + C$

c) $\int \sin(4x) \, dx$

$= -\frac{1}{4}\cos 4x + C$

d) $\int e^{2x} \, dx$

$= \frac{1}{2}e^{2x} + C$

e) $\int \frac{1}{x}\,dx$

$= \ln|x| + C$

f) $\int \frac{6x}{x^2+1}\,dx$

$u = x^2+1$
$du = 2x\,dx$
$3du = 6x\,dx$

$= 3\int \frac{du}{u}$

$= 3\ln|u| + C$

$= 3\ln|x^2+1| + C$

g) $\int \frac{1}{x^6}\,dx$

$= \int x^{-6}\,dx$

$= \frac{x^{-5}}{-5} + C$

h) $\int \frac{x^2}{(x^3+1)^4}\,dx$

$u = x^3+1$
$du = 3x^2\,dx$
$\frac{1}{3}du = x^2\,dx$

$= \frac{1}{3}\int \frac{du}{u^4}$

$= \frac{1}{3}\int u^{-4}\,du$

$= -\frac{1}{9}u^{-3} + C$

$= -\frac{1}{9}(x^3+1)^{-3} + C$

DERIVATIVE REVIEW

Find $f'(x)$:

a) $f(x) = \frac{1}{x^2}$ $= x^{-2}$

$f'(x) = -2x^{-3}$

b) $f(x) = (x^3 + 1)^4$

$f'(x) = 4(x^3+1)^3 \cdot 3x^2$

$= 12x^2(x^3+1)^3$

c) $f(x) = e^{6x}$

$f'(x) = 6e^{6x}$

d) $f(x) = \ln(2x + 1)$

$f'(x) = \frac{2}{2x+1}$

e) $f(x) = \sin(4x)$

$f'(x) = 4\cos 4x$

f) $f(x) = \cos x^2$

$f'(x) = -\sin x^2 \cdot 2x$

$= -2x \sin x^2$

g) $f(x) = \tan(9x+1)$

$f'(x) = \sec^2(9x+1) \cdot 9$

$= 9\sec^2(9x+1)$

h) $f(x) = \sec(3x)$

$f'(x) = \sec 3x \tan 3x \cdot 3$

$= 3\sec 3x \tan 3x$

i) $f(x) = \csc(2x)$

$f'(x) = -\csc 2x \cot 2x \cdot 2$

$= -2\csc 2x \cot 2x$

j) $f(x) = \cot x^3$

$f'(x) = -\csc^2 x^3 \cdot 3x^2$

$= -3x^2 \csc^2 x^3$

k) $f(x) = \sin^{-1} x$

$f'(x) = \frac{1}{\sqrt{1-x^2}}$

l) $f(x) = \tan^{-1} x$

$f'(x) = \frac{1}{1+x^2}$

MIXED REVIEW

Evaluate:

a) $\int e^{9x}\,dx$

$= \frac{e^{9x}}{9} + C$

b) $\frac{d}{dx}[e^{9x}]$

$= 9e^{9x}$

c) $\int \cos(2x)\,dx$

$= \frac{\sin 2x}{2} + c$

d) $\frac{d}{dx}[\cos(2x)]$

$= -2\sin 2x$

e) $\int \frac{5}{x}\, dx$

$= 5\ln|x| + C$

f) $\frac{d}{dx}\left[\frac{5}{x}\right]$ $= \frac{d}{dx}\left[5x^{-1}\right]$

$= -5x^{-2}$

g) $\int xe^{2x}\, dx$

Integration by Parts

	D	I
+	x	e^{2x}
−	1	$e^{2x}/2$
	0	$e^{2x}/4$

$= \frac{xe^{2x}}{2} - \frac{e^{2x}}{4} + C$