Math 1B
Group Quiz 7
Wed Mar 5, 2008

$-\frac{1}{4}$ POINT EACH TIME YOU FORGET "+C"

Code: ____________

[1 POINT] Evaluate $\int \sec^8 x \tan^3 x \, dx$.

$u = \sec x$

$\int (\sec x \tan x) \sec^7 x \tan^2 x \, dx$

$= \int u^7 (u^2 - 1) \, du$

$= \int (u^9 - u^7) \, du$

$= \frac{1}{10} u^{10} - \frac{1}{8} u^8 + C$

1

$= \frac{1}{10} \sec^{10} x - \frac{1}{8} \sec^8 x + C$

OR

1

$\frac{1}{10} \tan^{10} x + \frac{3}{8} \tan^8 x + \frac{1}{2} \tan^6 x + \frac{1}{4} \tan^4 x + C$

[1 POINT] Evaluate $\int x^3 \sin x \, dx$.

u		dv
x^3	$+$	$\sin x$
$3x^2$	$-$	$-\cos x$
$6x$	$+$	$-\sin x$
6	$-$	$\cos x$
0		$\sin x$

1

$-x^3 \cos x + 3x^2 \sin x + 6x \cos x - 6 \sin x + C$

[2 POINTS] Evaluate $\int e^{-2x} \cos 5x \, dx$.

u		dv
$\cos 5x$	$+$	e^{-2x}
$-5 \sin 5x$	$-$	$-\frac{1}{2} e^{-2x}$
$-25 \cos 5x$	$\pm$	$\frac{1}{4} e^{-2x}$

1

$\int e^{-2x} \cos 5x \, dx = -\frac{1}{2} e^{-2x} \cos 5x + \frac{5}{4} e^{-2x} \sin 5x - \frac{25}{4} \int e^{-2x} \cos 5x \, dx$

$\frac{29}{4} \int e^{-2x} \cos 5x \, dx = -\frac{1}{2} e^{-2x} \cos 5x + \frac{5}{4} e^{-2x} \sin 5x$

$\int e^{-2x} \cos 5x \, dx = -\frac{2}{29} e^{-2x} \cos 5x + \frac{5}{29} e^{-2x} \sin 5x + C$

1

OR

1

$\frac{1}{5} e^{-2x} \sin 5x - \frac{2}{25} e^{-2x} \cos 5x - \frac{4}{25} \int e^{-2x} \cos 5x \, dx$

[QUESTIONS ON OTHER SIDE]

[3 POINTS] Evaluate $\int \cos(\ln x)\,dx$.

$u = \ln x \longrightarrow x = e^u$

$\frac{du}{dx} = \frac{1}{x}$

$x\,du = dx$

$x\cos(\ln x)\,du = \cos(\ln x)\,dx$

$\int e^u \cos u\,du$ 1

u	dv
$\cos u$	e^u
$-\sin u$	e^u
$-\cos u$	e^u

1

$\int e^u \cos u\,du = e^u\cos u + e^u \sin u - \int e^u \cos u\,du$

$2\int e^u \cos u\,du = e^u(\cos u + \sin u)$

$\frac{1}{2}$ $\frac{1}{2}$

$\int e^u \cos u\,du = \frac{1}{2}e^u(\cos u + \sin u) = \frac{1}{2}x(\cos(\ln x) + \sin(\ln x)) + C$

OR

u	dv
$\cos(\ln x)$	1
$x\left(-\frac{1}{x}\sin(\ln x)\right)$	$(x)\frac{1}{x}$
$-\sin(\ln x)$	1
$-\frac{1}{x}\cos(\ln x)$	x

$\int \cos(\ln x)\,dx$ $2\frac{1}{2}$

$= x\cos(\ln x) + x\sin(\ln x) - \int \cos(\ln x)\,dx$

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

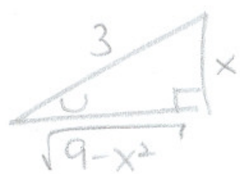
$= x\cos(\ln x) + x\sin(\ln x)$

[3 POINTS] Evaluate $\int \frac{1}{x^2\sqrt{9-x^2}}\,dx$

$x = 3\sin u$

$\frac{dx}{du} = 3\cos u$

$dx = 3\cos u\,du$



$\frac{1}{2}$ $\frac{1}{2}$

$\int \frac{1}{9\sin^2 u\sqrt{9\cos^2 u}}\,3\cos u\,du$

$= \frac{1}{9}\int \csc^2 u\,du$ $\frac{1}{2}$

$= -\frac{1}{9}\cot u + C$ $\frac{1}{2}$

$= -\frac{1}{9}\frac{\sqrt{9-x^2}}{x} + C$ 1

$= -\frac{\sqrt{9-x^2}}{9x} + C$