Math 1B (7:30am – 8:20am)
Quiz 7 Version A
Fri Jun 4, 2010

SCORE: ___ / 30 POINTS

What month is your birthday ? ___ ___
What are the first 2 digits of your address ? ___ ___
What are the last 2 digits of your zip code ? ___ ___
What are the last 2 digits of your social security number ? ___ ___
[IF YOU DO NOT HAVE A SOCIAL SECURITY NUMBER, USE YOUR STUDENT ID NUMBER]

NO CALCULATORS ALLOWED

YOU MUST SHOW PROPER CALCULUS LEVEL WORK (INCLUDING SANITY CHECKS WHERE RELEVANT) TO EARN FULL CREDIT

Find $\int \frac{1}{x^2\sqrt{x^2-9}}\,dx$.

SCORE: ___ / 7 POINTS

(1) $x = 3\sec\theta \longrightarrow \sec\theta = \frac{x}{3}$

$dx = 3\sec\theta\tan\theta\,d\theta$

(1) $\int \frac{1}{9\sec^2\theta\sqrt{9\sec^2\theta-9}}\,3\sec\theta\tan\theta\,d\theta$ (1)

$= \int \frac{1}{9\sec^2\theta(3\tan\theta)}\,3\sec\theta\tan\theta\,d\theta$ (1)

$= \frac{1}{9}\int \cos\theta\,d\theta$ (1)

$= \frac{1}{9}\sin\theta + C$ (1)

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

FOR EACH QUESTION:
SUBTRACT $\frac{1}{2}$ IF MISSING "+C"
SUBTRACT $\frac{1}{2}$ FOR EACH ABSOLUTE VALUE MISSING

Find $\int \frac{x+5}{(x+1)(x-1)^2}\,dx$.

SCORE: ___ / 7 POINTS

$= \int \left(\frac{A}{x+1} + \frac{B}{x-1} + \frac{C}{(x-1)^2}\right) dx$

$= \int \left(\frac{1}{x+1} - \frac{1}{x-1} + \frac{3}{(x-1)^2}\right) dx$ (1) (1/2) (1/2)

$= \ln|x+1| - \ln|x-1| - \frac{3}{x-1} + C$ (1/2) (1/2) (1)

$x+5 = A(x-1)^2 + B(x+1)(x-1) + C(x+1)$

$x=1: \; 6 = 2C \rightarrow C = 3$
$x=-1: \; 4 = 4A \rightarrow A = 1$
$x=0: \; 5 = A - B + C$
$5 = 1 - B + 3$
$B = -1$

(1) SANITY CHECK:
$x=2$: ORIGINAL $= \frac{7}{3}$
DECOMPOSITION $= \frac{1}{3} + \frac{-1}{1} + \frac{3}{1} = \frac{7}{3}$ ✓

Find $\int x(\ln x)^2\,dx$.

SCORE: ___ / 6 POINTS

u	dv
$(\ln x)^2$	$+\ x$
$2\ln x \cdot \frac{1}{x}$	$\frac{1}{2}x^2$
$2\ln x$	$-\ \frac{1}{2}x$
$\frac{2}{x}$	$\frac{1}{4}x^2$
2	$+\ \frac{1}{4}x$
0	$\frac{1}{8}x^2$

$\frac{1}{2}x^2(\ln x)^2 - \frac{1}{2}x^2\ln x + \frac{1}{4}x^2 + C$

(3) (2) (1)

Find $\int e^{3x}\cos 4x\,dx$. =

u	dv
e^{3x}	$+\ \cos 4x$
$3e^{3x}$	$-\ \frac{1}{4}\sin 4x$
$9e^{3x}$	$\pm\ -\frac{1}{16}\cos 4x$

$\frac{1}{4}e^{3x}\sin 4x + \frac{3}{16}e^{3x}\cos 4x - \frac{9}{16}\int e^{3x}\cos 4x\,dx$

(1½) (1½) (1)

SCORE: ___ / 6 POINTS

SO,

$\frac{25}{16}\int e^{3x}\cos 4x\,dx = \frac{1}{4}e^{3x}\sin 4x + \frac{3}{16}e^{3x}\cos 4x$

(1) (1)

$\int e^{3x}\cos 4x\,dx = \frac{4}{25}e^{3x}\sin 4x + \frac{3}{25}e^{3x}\cos 4x + C$

(½) (½)

SEE ALSO 7:30 VERSION B

Find $\int \frac{10-x^2}{x^2+2x-8}\,dx$.

SCORE: ___ / 4 POINTS

$= \int \left(-1 + \frac{2x+2}{x^2+2x-8}\right)dx$

(1) (1)

$= -x + \ln|x^2+2x-8| + C$

(½) (1½)

$$\begin{array}{r} -1 \\ x^2+2x-8 \overline{)\ -x^2 \quad +10} \\ \underline{-x^2-2x+8} \\ 2x+2 \end{array}$$