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Name: KEY	ID: KEY	Sec: 34(11:00-11:50) 23(1:10-2:00)

MATH-102 Term-132 Class-QUIZ-8

(show all your work)

1) (DONOT EVALUATE THE INTEGRALS). Write the suitable u and dv if we use the integration by parts.

2 each

integral	u	dv
$\int x\sin x\,dx$	$u = x$	$dv = \sin x\,dx$
$\int \ln(3x)\,dx$	$u = \ln(3x)$	$dv = dx$
$\int x\tan^{-1}x\,dx$	$u = \tan^{-1}x$	$dv = x\,dx$
$\int \ln(\cos x)\,dx$	$u = \ln(\cos x)$	$dv = dx$
$\int x(\ln x)^2\,dx$	$u = (\ln x)^2$	$dv = x\,dx$
$\int x\sec^2 x\,dx$	$u = x$	$dv = \sec^2 x\,dx$
$\int x\sec x\tan x\,dx$	$u = x$	$dv = \sec x\tan x\,dx$

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2) Evaluate the integrals $\int e^{-5x}\sin(\frac{3}{2}x)dx = I$ two integration by parts

$$I = e^{-5x}\left[-\frac{1}{5}\sin\left(\frac{3}{2}x\right) - \frac{3}{50}\cos\left(\frac{3}{2}x\right)\right] - \frac{9}{100}\int e^{-5x}\sin\left(\frac{3}{2}x\right)dx$$ 3

	e^{-5x}
$\sin(\frac{3}{2}x)$	+
$\frac{3}{2}\cos(\frac{3}{2}x)$	$-\frac{1}{5}e^{-5x}$
$-\frac{9}{4}\sin(\frac{3}{2}x)$	$\frac{1}{25}e^{-5x}$

$$\Rightarrow I = e^{-5x}\left[-\frac{1}{5}\sin\left(\frac{3}{2}x\right) - \frac{3}{50}\cos\left(\frac{3}{2}x\right)\right] - \frac{9}{100}I$$ 6

$$\left(1+\frac{9}{100}\right)I = e^{-5x}\left[-\frac{1}{5}\sin\left(\frac{3}{2}x\right) - \frac{3}{50}\cos\left(\frac{3}{2}x\right)\right]$$

$$I = \frac{100}{109}e^{-5x}\left[-\frac{1}{5}\sin\left(\frac{3}{2}x\right) - \frac{3}{50}\cos\left(\frac{3}{2}x\right)\right] + C$$

$$\frac{e^{-5x}}{109}\left[-20\sin\left(\frac{3}{2}x\right) - 6\cos\left(\frac{3}{2}x\right)\right] + C$$ 3

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$e^{-5x}\sin\left(\frac{3}{4}x\right)\cos\left(\frac{3}{4}x\right)$

$\frac{1}{2}e^{-5x}\sin\left(\frac{3}{2}x\right)$

$\sin(2\theta) = 2\sin\theta\cos\theta$

$I = \frac{1}{2}\int e^{-5x}\sin\left(\frac{3}{2}x\right)dx$

6

	e^{-5x}
$\sin\left(\frac{3}{2}x\right)$	
$\frac{3}{2}\cos\left(\frac{3}{2}x\right)$	$-\frac{1}{5}e^{-5x}$
$-\frac{9}{4}\sin\left(\frac{3}{2}x\right)$	$\frac{1}{25}e^{-5x}$

$= \frac{1}{2}e^{-5x}\left[-\frac{1}{5}\sin\left(\frac{3}{2}x\right) - \frac{3}{50}\cos\left(\frac{3}{2}x\right)\right]$

$-\frac{9}{100}I$

3

$\left(1+\frac{9}{100}I\right) = \frac{1}{2}e^{-5x}\left[-\frac{1}{5}\sin\left(\frac{3}{2}x\right) - \frac{3}{50}\cos\left(\frac{3}{2}x\right)\right]$

$I = \left(\frac{100}{109}\right)\left(\frac{1}{2}\right)e^{-5x}\left[-\frac{1}{5}\sin\left(\frac{3}{2}x\right) - \frac{3}{50}\cos\left(\frac{3}{2}x\right)\right] + C$

$= \frac{1}{109}e^{-5x}\left[-10\sin\left(\frac{3}{2}x\right) - 3\cos\left(\frac{3}{2}x\right)\right] + C$

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