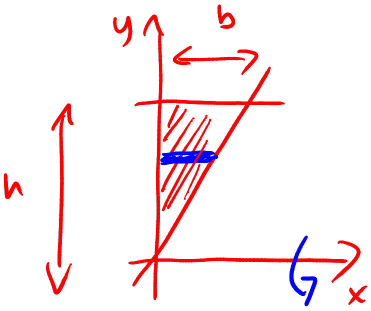
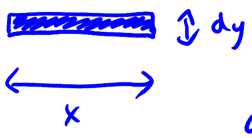
Section 28.7: cont'd:

Wednesday, February 13, 2013
10:47 AM

Assign 2 #2





$dA = x\,dy$

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example (more annoying):

$$\int \underbrace{x^2}_{u} \underbrace{e^{2x}\,dx}_{dv}$$

let $u = x^2$ $\quad v = \frac{1}{2}e^{2x}$
$du = 2x\,dx$ $\quad dv = e^{2x}\,dx$

$$= uv - \int v\,du$$

$$= \frac{1}{2}x^2 e^{2x} - \int \frac{1}{2}e^{2x}(2x\,dx)$$

$$= \frac{1}{2}x^2 e^{2x} - \int \underset{u}{x}\,\overset{dv}{\boxed{e^{2x}\,dx}}$$

let $u = x$ $\quad v = \frac{1}{2}e^{2x}$
$du = dx$ $\quad dv = e^{2x}\,dx$

$$= \frac{1}{2}x^2 e^{2x} - \left[uv - \int v\,du\right]$$

$$= \frac{1}{2}x^2 e^{2x} - \frac{1}{2}x\,e^{2x} + \int \frac{1}{2}e^{2x}\,dx$$

$$= \tfrac{1}{2}x^2e^{2x} - \tfrac{1}{2}xe^{2x} + \tfrac{1}{4}e^{2x} + C$$

let's do the same question using an alternate method:

consider $\int x^2 e^{2x}\,dx$ from before

our first step was to choose u & dv.

$u = x^2$

$dv = e^{2x}\,dx$

our next step was to <u>differentiate</u> u to get du

<u>integrate</u> dv to get v

tabular method:

	D		I	
put u here →	x^2	$+$	e^{2x}	← put dv here, but omit the dx
	$2x$	$-$	$\tfrac{1}{2}e^{2x}$	
	2	$+$	$\tfrac{1}{4}e^{2x}$	
	0		$\tfrac{1}{8}e^{2x}$	

$$\int x^2e^{2x}\,dx = x^2\left(\tfrac{1}{2}e^{2x}\right) - (2x)\left(\tfrac{1}{4}e^{2x}\right) + 2\left(\tfrac{1}{8}e^{2x}\right) + C$$

$$= \tfrac{1}{2}x^2e^{2x} - \tfrac{1}{2}xe^{2x} + \tfrac{1}{4}e^{2x} + C$$

Use the tabular method to integrate

$$\int x^2 \ln x \, dx$$

D		I
$\ln x$	$+$	x^2
$\frac{1}{x}$	$-$	$\frac{1}{3}x^3$

$\searrow$ uv

$\leftarrow$ $\int v\,du$

$$\int x^2 \ln x \, dx = \ln x\left(\tfrac{1}{3}x^3\right) - \int \frac{1}{x}\left(\tfrac{1}{3}x^3\right)dx$$

$$= \tfrac{1}{3}x^3 \ln x - \int \tfrac{1}{3}x^2\,dx$$

$$= \tfrac{1}{3}x^3 \ln x - \tfrac{1}{9}x^3 + C$$