Review, continued:

Thursday, March 14, 2013
10:45 AM

Name that method! (Give the first step or steps to integrate.)

① $\displaystyle\int \frac{12e^x\,dx}{2e^x+5}$

let $u = 2e^x + 5$
$du = 2e^x\,dx$

$$= \int \frac{6\,du}{u} = 6\ln|u| + C$$
$$= 6\ln(2e^x+5) + C$$

② $\displaystyle\int \frac{2x+3}{x^2+9}\,dx = \int \frac{2x}{x^2+9}\,dx + \int \frac{3}{x^2+9}\,dx$

substitution

arctan form

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

let $u = \tan\theta - 1$
$du = \sec^2\theta\,d\theta$

$$= \int \frac{du}{u^{1/2}} = 2u^{1/2} + C$$
$$= 2(\tan\theta-1)^{1/2} + C$$

④ $\displaystyle\int \frac{32\,dt}{\sqrt{1-4t^2}}$

let $u = 2t$
$du = 2\,dt$

$$= \int \frac{16\,du}{\sqrt{1-u^2}}$$
$$= 16\sin^{-1}\left(\frac{u}{1}\right) + C$$
$$= 16\sin^{-1}(2t) + C$$

⑤ $\int_0^1 x e^{-x^2}\,dx$

let $u = -x^2$

$du = -2x\,dx$

$= \int_{x=0}^{x=1} -\frac{1}{2} e^u\,du$

⑥ $\int e^{4x}\cos x\,dx$ $\leftarrow$ parts

method #1:

D	I
$\cos x$	e^{4x}

method #2: $u = \cos x$ $\quad v = \frac{1}{4}e^{4x}$

$du = -\sin x\,dx$ $\quad dv = e^{4x}\,dx$

⑦ $\int \frac{dx}{x^2\sqrt{4-x^2}}$

let $x = 2\sin\theta$

$dx = 2\cos\theta\,d\theta$

$= \int \frac{2\cos\theta\,d\theta}{4\sin^2\theta\sqrt{4-4\sin^2\theta}}$

$\sqrt{x^2+y^2} \neq x+y$

$= \int \frac{2\cos\theta\,d\theta}{4\sin^2\theta\sqrt{4\cos^2\theta}}$

$\sqrt{x^2y^2} = xy$

$= \int \frac{\cancel{2}\cancel{\cos\theta}\,d\theta}{4\sin^2\theta\;\cancel{2}\cancel{\cos\theta}}$

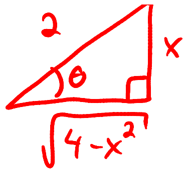
$= \int \frac{1}{4}\csc^2\theta\,d\theta$

$= -\frac{1}{4}\cot\theta + C$

$= -\frac{1}{4}\frac{\sqrt{4-x^2}}{x} + C$

let $x = 2\sin\theta$

$\sin\theta = \frac{x}{2}$



(8) $\displaystyle\int \frac{p^4\,dp}{9+p^{10}}$

let $u = p^5$
$du = 5p^4\,dp$

$$= \underbrace{\int \frac{1}{5}\,\frac{du}{9+u^2}}_{\text{arctan form}}$$

(9) $\displaystyle\int \frac{(\ln x - 2)^2}{x}\,dx$

let $u = \ln x - 2$
$du = \frac{1}{x}\,dx$

$$= \int u^2\,du$$