AP Calculus AB
Wednesday, February 19, 2014

Please check HW with someone & write the number of any problem problems on the board.

29, 31, 33

$$\int \frac{x}{\sqrt{1-x^2}}\,dx \longrightarrow \int x\left(1-x^2\right)^{-1/2}dx$$

$$\begin{cases} u = 1-x^2 \\ \frac{du}{dx} = -2x \\ du = -2x\,dx \\ -\frac{1}{2}du = x\,dx \end{cases}$$

$$\int u^{-1/2}\cdot -\frac{1}{2}\,du$$

$$-\frac{1}{2}\int u^{-1/2}\,du$$

$$= -\frac{1}{2}\cdot\frac{u^{1/2}}{1/2} + C$$

$$= -1\cdot(1-x^2)^{1/2} + C$$

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

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

no u-sub needed

OR

$\int \frac{1}{\sqrt{2}\sqrt{x}}$

$u = 2x$

$du = 2\,dx$

$\frac{1}{2}du = dx$

$= \int u^{-1/2} \cdot \frac{1}{2}\,du$

$= \frac{1}{2}\int u^{-1/2}\,du$

$= \frac{1}{2} \cdot \frac{u^{1/2}}{1/2} + C$

$= u^{1/2} + C$

$= \sqrt{2x} + C$

7.2 p297

41, 45, 47, 51

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

$\sin 14x = 2\sin 7x\cos 7x$

$\sin 100\theta = 2\sin 50\theta\cos 50\theta$

$\int \sin 2x \cos 2x\, dx$

$\sin 4x = 2\sin 2x\cos 2x$

$\frac{1}{2}\sin 4x = \sin 2x\cos 2x$

$\int \frac{1}{2}\sin 4x\, dx$

$u = 4x$

$du = 4dx$

$\frac{1}{4}du = dx$

$\frac{1}{2}\int \sin u \cdot \frac{1}{4}du$

$\frac{1}{8}\int \sin u\, du$

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

$= -\frac{1}{8}\cos 4x + C$

another way...

$\int \sin 2x\cos 2x\, dx$

$u = 2x$

$du = 2dx$

$dx = \frac{1}{2}du$

$\frac{1}{2}\int \sin u\cos u\, du$

$v = \sin u$

$dv = \cos u\, du$

$\frac{1}{2}\int v\, dv$

$\frac{1}{2}\cdot\frac{v^2}{2} + C$

$= \frac{\sin^2 u}{4} + C$

$= \frac{\sin^2 2x}{4} + C$

$\int \frac{\csc^2 x}{\cot^3 x}\, dx$

Let $u = \cot x$

$\frac{du}{dx} = -\csc^2 x$

$-1\cdot du = \csc^2 x\, dx$

$\frac{d}{dx}(\cot x) = -\csc^2 x\, dx$

$\int \frac{-1\cdot du}{u^3}$

$\int -1u^{-3}\, du$

$= \frac{-1\cdot u^{-2}}{-2} + C$

$= \frac{1}{2\cot^2 x} + C$

8-54 even page 297