AP Calculus AB
Monday, February 24, 2014

ETEH this week with me

Evaluate:

① $\int_0^{\pi} \sin x\,dx$

$= -\cos x \Big|_0^{\pi}$

$= -\cos\pi - (-\cos 0)$

$= -(-1) - (-1)$

$= 1+1$

$= 2$

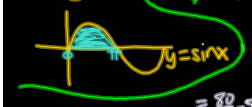
② $\int_{-1}^{3} (x-2)^3\,dx$

$\int_{-1}^{3} (x^3 - 6x^2 + 12x - 8)\,dx$

$= \frac{x^4}{4} - \frac{6x^3}{3} + \frac{12x^2}{2} - 8x \Big|_{-1}^{3}$

$= \frac{x^4}{4} - 2x^3 + 6x^2 - 8x \Big|_{-1}^{3}$

$= \frac{81}{4} - 27 + 6\cdot 9 - 8 - 3 - \left(\frac{1}{4} + 2 + 6 + 8\right)$



$= \frac{80}{4} - 24 + \frac{1}{4} - 24 - 16$

$= 20 - 24 - 16$

$= -20$

$\int_{-1}^{3} (x-2)^3\,dx \qquad u = x-2$

$du = dx$

$\int_{-3}^{1} u^3\,du = \frac{u^4}{4} \Big|_{-3}^{1} = \frac{1}{4} - \left(\frac{81}{4}\right) = -20$

Error Analysis for last Friday's quiz is due Wednesday, February 26 by the end of the day.

$\int [2x + \sin(1-8x)]\,dx$

$\int (f \pm g)\,dx = \int f\,dx \pm \int g\,dx$

Rewrite

$\underbrace{\int 2x\,dx}_{x^2} + \int \sin(1-8x)\,dx$

$u = 1-8x$

$du = -8\,dx$

$-\frac{1}{8}\,du = dx$

$x^2 + \int (\sin u) \cdot -\frac{1}{8}\,du$

$x^2 + -\frac{1}{8}\int \sin u\,du$

$= x^2 + \frac{1}{8}\cos u + C$

$= x^2 + \frac{1}{8}\cos(1-8x) + C$

⑮ $\int \sin 4x \cos 4x\,dx$

TRIG SUB

$\sin 2\theta = 2\sin\theta\cos\theta$

$\frac{1}{2}\sin 2\theta = \sin\theta\cos\theta$

$\theta = 4x$

$\frac{1}{2}\sin 8x = \sin 4x \cos 4x$

$\int \frac{1}{2}\sin 8x\,dx$

$u = 8x$

(16) $\int \tan^2(4x-1)\sec^2(4x-1)\,dx$

$u = 4x-1$

$du = 4\,dx$

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

$\int (\tan^2 u \sec^2 u)\cdot\frac{1}{4}\,du$

$\frac{1}{4}\int \tan^2 u \sec^2 u\,du$

$v = \tan u$

$dv = \sec^2 u \cdot du$

$\frac{1}{4}\int v^2\,dv$

$\frac{1}{4}\cdot\frac{v^3}{3} + C$

$= \frac{1}{4}\cdot\frac{\tan^3 u}{3} + C$

$= \frac{1}{12}\cdot\tan^3(4x-1) + C$

Definite integration w/ u-sub:

Evaluate $\int_0^2 (3x-1)^4\,dx$

$u = 3x-1$

$du = 3dx$

$\frac{1}{3}du = dx$

$\int_{-1}^{5} u^4 \cdot \frac{1}{3}\,du$

$= \frac{u^5}{15}\Big|_{-1}^{5} = \frac{5^5}{15} - \left(\frac{-1}{15}\right)$ Stephanie Lit FR

$= \frac{5^5}{15} + \frac{1}{15} = \frac{3126}{15}$

$= 1042\frac{1}{5}$

Ex. $\int_1^4 \sqrt{2x-1}\,dx = \int_1^7 u^{1/2} \cdot \frac{1}{2}\,du$

$u = 2x-1$

$du = 2dx$

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

$= \frac{1}{2} \cdot \frac{u^{3/2}}{3/2}\Big|_1^7$

$= \frac{1}{3} \cdot u^{3/2}\Big|_1^7$

$= \frac{1}{3} \cdot 7^{3/2} - \frac{1}{3} \cdot 1^{3/2}$

(13) $\int \left(2 - \frac{2}{x}\right)^4 \left(\frac{1}{x^2}\right) dx$

$u = 2 - \frac{2}{x}$ $\int u^4 \cdot \frac{1}{2}\,du$

$u = 2 - 2x^{-1}$

$du = 2x^{-2}\,dx = \frac{2}{x^2}\,dx$ $\frac{1}{2}du = \frac{1}{x^2}dx$ OR $2 \cdot \frac{1}{x^2}dx$