AP Calculus AB

Thursday, January 10, 2013

Bellwork...Find the derivative of each.

① $f(x) = \frac{(3x-2)^5}{15}$ ② $g(x) = \frac{2(5x-2)^{3/2}}{15}$

③ $h(x) = \frac{2}{5}(6x-1)^{5/3}$ ④ $y = \frac{1}{3}(x^2-2)^{3/2}$

⑤ $f(x) = \frac{1}{4}\sin^4 x$

⑥ What do all of these problems have in common? How do you think this applies to integration?

① $(3x-2)^4$

② $(5x-2)^{1/2}$

③ $4(6x-1)^{2/3}$

④ $x\sqrt{x^2-2}$

⑤ $x\sin^3 x\cos x$

① $\int (3x-2)^4\,dx$

$\frac{(3x-2)^5}{5} + \frac{1/3}{5}$

$\frac{(3x-2)^5}{15} + C$

③ $\int 4(6x-1)^{2/3}\,dx$

$= \frac{\frac{4(6x-1)^{5/3}}{5/3}}{6} + C$

$= \frac{1}{6} \cdot \frac{12(6x-1)^{5/3}}{5} + C$

$= \frac{2(6x-1)^{5/3}}{5} + C$

④ $\int x\sqrt{x^2-2}\,dx$

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

$= \frac{\frac{2}{3}x(x^2-2)^{3/2}}{2x} + C$

$= \frac{1}{3}(x^2-2)^{3/2} + C$

⑤ $\int \sin^3 x\cos x\,dx$

$= \int (\sin x)^3 \cos x\,dx$

$(\quad)^4$

Ex. $\int x(x^2-1)^5\,dx$

$= \dfrac{x(x^2-1)^6}{6\cdot 2x} + C$

$= \dfrac{(x^2-1)^6}{12} + C$

Ex. $\int \dfrac{x}{\sqrt[3]{2x^2-1}}\,dx$

$= \int x(2x^2-1)^{-1/3}\,dx$

$= \dfrac{x(2x^2-1)^{2/3}}{4x\cdot 2/3} + C$

$= \dfrac{3}{8}\cdot(2x^2-1)^{2/3} + C$

Ex. $\int 3\sin(1-3x)\,dx$

Ex. $\int (x+2)\sqrt{x-4}\,dx$