POP QUIZ 1

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④ - ⑧. $\tan(3z)\sin(x) = z$, $\frac{dz}{dx}$: ?

~~$3\sec^2(3z)\cos(x)\frac{dz}{dx}$~~

$u = \tan(3z)$ $\quad v = \sin(x)$

$u' = 3\sec^2(3z)\frac{dz}{dx}$ $\quad v' = \cos(x)$

$\Rightarrow u'.v + v'.u$

$\Rightarrow 3.\sec^2(3z)\frac{dz}{dx} + \cos(x).\tan(3z) = \frac{dz}{dx}$

$\cos(x).\tan(3z) = 1\frac{dz}{dx} - 3\sec^2(3z)\frac{dz}{dx}$

$\Rightarrow \frac{dz}{dx}(1 - 3\sec^2(3z)) = \cos(x).\tan(3z)$

$\frac{dz}{dx} = \frac{\cos(x).\tan(3z)}{1 - 3\sec^2(3z)}$

⑨. 2. $\frac{1}{x^2-9}\,dx$

$\Rightarrow \left(\frac{1}{(x+3)(x-3)} = \frac{A}{(x+3)} + \frac{B}{(x-3)}\right)(x+3)(x-3)$

$\Rightarrow 1 = A(x-3) + B(x+3) \Rightarrow 1 = Ax - 3A + Bx + 3B$

$-3A + 3B = 1$ $\quad -3A + 3B = 1$

$A + B = 0 \;|\cdot 3$ $\Rightarrow$ $3A + 3B = 0$

$6B = 1$

$A = -\frac{1}{6}$ $\quad B = \frac{1}{6}$

$\Rightarrow \int \frac{-\frac{1}{6}}{x+3} + \int \frac{\frac{1}{6}}{x-3} \Rightarrow -\frac{1}{6}\ln|x+3| + \frac{1}{6}\ln|x-3| + C$

⑤. $f(x) = \frac{d}{dx}(\sin^2(1-x^3))$, $\frac{dy}{dx}$?

$\Rightarrow 2.\sin(1-x^3).\cos(1-x^3).-3x^2$

$\Rightarrow -6x^2.\sin(1-x^3).\cos(1-x^3)$

④. $\int (x+1)\sqrt{2x-1}$ $\Rightarrow$ $u = 2x-1$ $\quad du = 2\,dx$ $\quad dx = \frac{du}{2}$

$u+1 = 2x$

$\frac{u+1}{2} = x$ (+1 kedua ruas)

$\left(\frac{u+1}{2}\right)+1 = x+1$ $\quad\Rightarrow\quad$ $\frac{u+3}{2} = x+1$

$\left(\frac{u+1}{2} + \frac{2}{2}\right) = x+1$

$\Rightarrow \int \left(\frac{u+3}{2}\right)^2 \sqrt{u} \cdot \frac{du}{2}$

$\Rightarrow \int \frac{(u^2+6u+9)}{4} \cdot \frac{\sqrt{u}}{2}$

$\Rightarrow \frac{1}{8} \int u^{\frac{5}{2}} + 6u^{\frac{3}{2}} + 9u^{\frac{1}{2}}$

$\Rightarrow \frac{1}{8}\left(\frac{2}{7}u^{\frac{7}{2}} + \frac{12}{5}u^{\frac{5}{2}} + 6u^{\frac{3}{2}}\right)$

$\Rightarrow \frac{2}{56}(2x-1)^{\frac{7}{2}} + \frac{12}{5}(2x-1)^{\frac{5}{2}} + 6(2x-1)^{\frac{3}{2}} + C$

⑤. $\int \sin^3(x) \cdot \cos^{3/2}(x)\,dx$

$\int \sin^2 x \cdot \sin x \cdot \cos^{3/2}(x)\,dx$

$\Rightarrow \int \sin x \left(1-\cos^2 x\right) \cdot (\cos^{3/2} x) \cdot (\sin x) \cdot dx$

$\Rightarrow \int (\cos^{3/2} x - \cos^{7/2} x) \cdot \sin x\,dx$

$u = \cos x \qquad dx = -\frac{du}{\sin x}$

$du = -\sin x\,dx$

$\int (u^{3/2} - u^{7/2}) \cdot \sin x \cdot -\frac{du}{\sin x}$

$-\int u^{3/2} - u^{7/2}\,du$

$\Rightarrow -\left(\frac{2}{5}u^{\frac{5}{2}} - \frac{2}{9}u^{\frac{9}{2}}\right)$

$\Rightarrow -\left(\frac{2}{5}\cos^{\frac{5}{2}}(x) - \frac{2}{9}\cos^{\frac{9}{2}} x\right)$

$\Rightarrow \frac{2}{9}\cos^{\frac{9}{2}} x - \frac{2}{5}\cos^{\frac{5}{2}} x + C$