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1. Evaluate $\int \cos^2(x)\,dx$ $= \int \frac{1}{2}(1+\cos 2x)\,dx = \int \frac{1}{2} + \frac{1}{2}\cos 2x\,dx$

$= \frac{1}{2}x + \frac{1}{4}\sin 2x + C$

2. Evaluate $\int_0^{\pi/2} \sin^4(x)\cos^5(x)\,dx$

$= \int_0^{\pi/2} \sin^4 x \cos^4 x \cdot \cos x\,dx$

$= \int_0^{\pi/2} \sin^4 x(1-\sin^2 x)^2 \cos x\,dx$

$\Rightarrow$ LET $u = \sin x$, $du = \cos x\,dx$

$\int_{x=0}^{x=\pi/2} u^4(1-u^2)^2\,du$

$= \int_{x=0}^{x=\pi/2} u^4(1-2u^2+u^4)\,du$

$= \int_0^{\pi/2} u^4 - 2u^6 + u^8\,du$

$= \frac{1}{5}u^5 - \frac{2}{7}u^7 + \frac{1}{9}u^9 \Big|_{x=0}^{x=\pi/2}$

$= \frac{1}{5}\sin^5 x - \frac{2}{7}\sin^7 x + \frac{1}{9}\sin^9 x \Big|_0^{\pi/2}$

$= \left[\frac{1}{5} - \frac{2}{7} + \frac{1}{9}\right] - \left[0 - 0 + 0\right] = 8/315$

3. Evaluate $\int \frac{4}{x^2\sqrt{x^2-4}}\,dx$

LET $x = 2\sec\theta$, $dx = 2\sec\theta\tan\theta\,d\theta$

$$\Rightarrow \int \frac{4}{4\sec^2\theta\sqrt{4\sec^2\theta-4}} \cdot 2\sec\theta\tan\theta\,d\theta$$

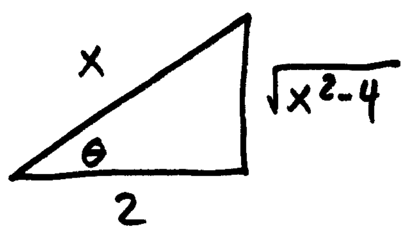
$$= \int \frac{8\sec\theta\tan\theta\,d\theta}{4\sec^2\theta\sqrt{4\tan^2\theta}}$$

$$= \int \frac{8\sec\theta\tan\theta\,d\theta}{4\sec^2\theta \cdot 2\tan\theta}$$

$$= \int \frac{1}{\sec\theta}\,d\theta$$

$$= \int \cos\theta\,d\theta = \sin\theta + C$$

USE TRIANGLE



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