Find $\int x^3 \cos(x^4 + 2)\,dx$

$u = x^4 + 2$

$du = 4x^3\,dx$

$\frac{du}{4x^3} = dx$

$\int x^3 \cos(u) \frac{du}{4x^3}$

$\frac{1}{4}\int \cos(u)\,du$

$\frac{1}{4}\sin(u) = \boxed{\frac{1}{4}\sin(x^4+2)}$

$$\int \frac{x^3}{x^4 - 5}\,dx$$

$u = x^4 - 5$

$du = 4x^3\,dx$

$\frac{du}{4x^3} = dx$

$$\int \frac{x^3}{u} \cdot \frac{du}{4x^3}$$

$$\frac{1}{4}\int \frac{1}{u}\,du = \frac{1}{4}\ln|u| = \boxed{\frac{1}{4}\ln|x^4-5| + C}$$

$$\int (x^{1.3} + 11x^{4.5})\, dx = \frac{x^{2.3}}{2.3} + \frac{11}{5.5}x^{5.5}$$

$$= \boxed{\frac{x^{2.3}}{2.3} + 2x^{5.5} + C}$$

$$\int \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx$$

$$u = \sqrt{x}$$

$$du = \frac{1}{2\sqrt{x}}\,dx$$

$$2\sqrt{x}\,du = dx$$

$$\int \frac{e^u}{u}\,2\sqrt{x}\,du$$

$$2\int e^u\,du = 2e^u \rightarrow \boxed{2e^{\sqrt{x}} + C}$$

$$\int_1^{16} x^{-\frac{3}{4}}\,dx$$

$$-\frac{3}{4}+1=\frac{1}{4}$$

$$\frac{x^{1/4}}{1/4}\Bigg|_1^{16} = 4\sqrt[4]{x}\,\Bigg|_1^{16} = 4(2-1) = 4$$

$$4\left(\sqrt[4]{16}-\sqrt[4]{1}\right)$$

$$\int_0^1 (1-x)^9\,dx$$

$u = 1 - x$

$du = -dx$

$-du = dx$

$$-\int_0^1 u^9\,du$$

$$-\left.\frac{u^{10}}{10}\right|_0^1 = -\left(\frac{1^{10}}{10} - \frac{0^{10}}{10}\right) = -\frac{1}{10}$$

$$\int \frac{e^x}{(7-e^x)^2}\,dx$$

$u = 7 - e^x$

$du = -e^x\,dx$

$\frac{du}{-e^x} = dx$

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

$= -1u^{-1}$

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$$\int \frac{e^x}{(u)^2}\,\frac{du}{-e^x}$$

$$(-)\int \frac{1}{u^2}\,du = -\left(-\frac{1}{u}\right) = \frac{1}{(7-e^x)} + C$$

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

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

$$= \frac{1}{2}\left(\frac{u^{3/2}}{3/2} - \frac{u^{1/2}}{1/2}\right)$$

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

$$\int_0^1 \sin(3\pi t)\,dt$$

$u = 3\pi t$

$du = 3\pi\, dx$

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

$$\int_0^1 \sin(u) \frac{du}{3\pi}$$

$$\frac{1}{3\pi}\int_0^1 \sin(u)\,du = \frac{1}{3\pi}\left(-\cos(3\pi t)\right)\Big|_0^1 = \frac{1}{3\pi}\left(1 + (+1)\right)$$

$$= \frac{2}{3\pi}$$

$$\int_{-4}^{4} \left(2x - \sqrt{16 - x^2}\right) dx$$

$u = 16 - x^2$

$du = -2x \ dx$

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

$\int \left(2x - \sqrt{u}\right) \frac{du}{-2x}$

$\int \frac{2x}{-2x} - \frac{\sqrt{u}}{-2x} \ du$

$\int -1 + \frac{\sqrt{u}}{2x} \ du$

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$$\int_{-4}^{4} \left(2x - \sqrt{16 - x^2}\right) dx = 32 - 8\pi$$

$$\int_{-4}^{4} 2x \cdot dx - \int_{-4}^{4} \sqrt{16 - x^2}\, dx$$

$u = 16 - x^2$

$du = 2x\, dx$

$$x^2 \Big|_{-4}^{4} - 8\pi$$

you cant do

$16 + 16$

$$\sqrt{16 - x^2} = y$$

$$16 - x^2 = y^2$$

$$16 = x^2 + y^2$$

$$4^2 = x^2 + y^2$$