Compute the antiderivatives

$$\int e^{2x} \cos(1-e^{2x})\, dx \ , \quad \int 4x(5x-1)^{1/3}\, dx$$

and $\int \tan x \, dx$.

Compute the antiderivatives

$\int e^{2x}\cos(1-e^{2x})\,dx$, $\int 4x(5x^2-1)^{1/3}\,dx$

and $\int \tan x\,dx$.

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$$\int e^{2x}\cos(1-e^{2x})\,dx$$

Let $u = 1-e^{2x}$, $du = -2e^{2x}\,dx$.

$$\Rightarrow \int e^{2x}\cos(1-e^{2x})\,dx$$

$$= \int \cos(u) \, -\frac{1}{2}\,du$$

$$= -\frac{1}{2}\sin u + C$$

$$= -\frac{1}{2}\sin(1-e^{2x}) + C$$

Let $u = 5x^2-1$. $\Rightarrow du = 10x\,dx$

$$\int 4x(5x^2-1)^{\frac{1}{3}}dx = \int \frac{2}{5}(u)^{\frac{1}{3}}\,du$$

$$= \frac{2}{5}\,\frac{u^{\frac{4}{3}}}{\frac{4}{3}} + C$$

$$= \frac{3}{10}u^{\frac{4}{3}} + C$$

$$= \frac{3}{10}(5x^2-1)^{\frac{4}{3}} + C$$

$$\int \tan x \, dx$$

Let $u = \cos x$.

$\Rightarrow du = -\sin x \, dx$

$$= \int \frac{\sin x}{\cos x} \, dx$$

$$\Rightarrow \int \tan x \, dx$$

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

$$= -\ln|u| + C$$

$$= -\ln|\cos x| + C$$