Warm-up:

5.8 Find $\int \frac{e^x - e^{-x}}{e^x + e^{-x}} dx$

$u = e^x + e^{-x}$

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

$\int u^{-1} du$

$= \ln|u| + C$

$\boxed{\ln|e^x + e^{-x}| + C}$

Bases other than e!

Definitions:

$\frac{d}{dx} a^x = \ln a \bullet a^x$

3^x

$\frac{d}{dx} \log_a x = \frac{1}{x \ln a}$

NEW ONE!!

$\boxed{\int a^x dx = \frac{1}{\ln a} a^x + C}$

$\int 3^x dx = \frac{3^x}{\ln 3} + c$

$\int 4^x dx$

$= \frac{4^x}{\ln 4} + C$

$\int 2^{-x} dx$

$u = -x$

$du = -dx$

$-\int 2^u du$

$= \frac{-2^u}{\ln 2} + C$

$= \boxed{\frac{-2^{-x}}{\ln 2} + C}$

$\int x 10^{x^2} dx$

$u = x^2$

$du = 2x\, dx$

$\frac{1}{2} \int 10^u du = \frac{\frac{1}{2} 10^u}{\ln 10} + C$

$= \boxed{\frac{10^{x^2}}{2 \ln 10} + C}$

$\int 2^{\sin x} \cos x dx$

$u = \sin x$
$du = \cos x dx$

$\int 2^u du = \frac{2^u}{\ln 2} + C$

$\boxed{\frac{2^{\sin x}}{\ln 2} + C}$

$e^x \quad \ln x$
a^x

$\frac{1}{3}\int_0^1 e^u du$

$u = x^3$
$du = 3x^2 dx$

$\frac{1}{3} e^u \Big]_0^1 = \frac{1}{3}e - \frac{1}{3} =$ .5728

2. $\int \ln x \cdot \frac{1}{3x} dx$

$u = \ln x$
$du = \frac{1}{x} dx$

$\frac{1}{3}\int u^{1+1} du$

$\frac{1}{3} \cdot \frac{1}{2} u^2 = \frac{1}{6} u^2 + C$

$\boxed{\frac{1}{6}(\ln x)^2 + C}$

$\frac{1}{3}(\ln x)^1 \cdot \frac{1}{x}$

$\frac{\ln x}{3x}$

3. $\int 3^{-x}\,dx$ $\quad u=-x$, $du=-dx$

$-\int 3^{u}\,du = \frac{-3^{u}}{\ln 3}+C$

$\boxed{\frac{-3^{-x}}{\ln 3}+C}$

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

$\frac{2}{3}\int u^{-1}\,du =$

$\frac{2}{3}\ln|u|+C$

$\boxed{\frac{2}{3}\ln|x^{3}-1|+C}$