

"e notes"

Integral Definition

$$\int e^x dx = e^x + C$$

$$\int \cancel{3x^2} e^{\cancel{x^3}} dx \quad u = x^3$$

$$du = 3x^2 dx$$

$$\int e^u du = e^u + C = \boxed{e^{x^3} + C}$$

$$\int e^{\frac{1}{2}x} dx \quad u = \frac{1}{2}x$$

$$du = \frac{1}{2} dx$$

$$2 \int e^u du = 2e^u + C$$

$$\boxed{2e^{\frac{1}{2}x} + C}$$

$$\int \cancel{\frac{3}{2}} e^{\cancel{x^{-3}}} dx \quad u = 3x^{-2}$$

$$du = -6x^{-3} dx$$

$$-\frac{1}{6} \int e^u du = -\frac{1}{6} e^u + C$$

$$\boxed{-\frac{1}{6} e^{3x^{-2}} + C}$$

$$\int e^x \sqrt{2+e^x} dx \quad \begin{array}{l} u=2+e^x \\ du=e^x dx \end{array}$$

$$\int u^{\frac{1}{2}+\frac{1}{2}} du = \frac{2}{3} u^{\frac{3}{2}} + C$$

$$\boxed{\frac{2}{3} (2+e^x)^{\frac{3}{2}} + C}$$

$$\int \frac{e^{3x}}{1+e^{3x}} dx \quad \begin{array}{l} u=1+e^{3x} \\ du=e^{3x} \cdot 3 dx \\ =3e^{3x} dx \end{array}$$

$$\frac{1}{3} \int u^{-1} du = \frac{1}{3} \ln|u| + C$$

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

$$\int \frac{e^{3x} + 3e^x + 2}{e^x} dx$$

$$\int \frac{e^{3x}}{e^x} + \frac{3e^x}{e^x} + 2e^{-x} dx$$

$$\int (e^{2x} + 3 + 2e^{-x}) dx \quad \begin{array}{l} u=2x \\ du=2dx \\ u=-x \\ du=-dx \end{array}$$

$$\frac{1}{2} \int e^u du \quad \downarrow \quad -2 \int e^u du$$

$$\frac{1}{2} e^u \quad \downarrow \quad -2e^u$$

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

$$\int_1^e \frac{e(\ln x)^4}{x} dx \quad \begin{array}{l} u=\ln x \\ du=\frac{1}{x} dx \end{array}$$

$$\int_0^1 u^4 du = \frac{1}{5} u^5 \Big|_0^1 = \frac{1}{5} - 0 = \frac{1}{5}$$