Then from **4.1.24**

$\ln 1131.718=(.00063\ 4836)-\frac{1}{2}(.00063\ 4836)^2$
$+\ln 1.131+3\ln 10=.00063\ 4836-.00000\ 0202$
$+.12310\ 2197+6.90775\ 5279=7.03149\ 211.$

Example 6.

Compute $\ln x$ working with 16D for
$$x=1.38967\ 12458\ 179231.$$

Since $\frac{x}{1.389}=1.00048\ 32583\ 282384=1+a$, using **4.1.24** and **Table 4.2** we compute successively

$$a=\ .00048\ 32583\ 282384$$
$$-\frac{a^2}{2}=-.\qquad 1167\ 693059$$
$$\frac{a^3}{3}=\ .\qquad 376199$$
$$-\frac{a^4}{4}=-.\qquad 136$$
$$\ln(1+a)=\ .00048\ 31415\ 965388$$
$$\ln 1.389=\ .32858\ 40637\ 722067$$
$$\ln x=\ .32906\ 72053\ 687455.$$

Example 7.

Compute the principal value of $\ln(\pm 2\pm 3i)$.
From **4.1.2, 4.1.3** and **Tables 4.2** and **4.14.**

$$\ln(2+3i)=\frac{1}{2}\ln(2^2+3^2)+i\arctan\frac{3}{2}$$
$$=1.282475+i(.982794)$$
$$\ln(-2+3i)=\frac{1}{2}\ln 13+i\left(\pi-\arctan\frac{3}{2}\right)$$
$$=1.282475+i(2.158799)$$
$$\ln(-2-3i)=\frac{1}{2}\ln 13+i\left(-\pi+\arctan\frac{3}{2}\right)$$
$$=1.282475-i(2.158799)$$
$$\ln(2-3i)=\frac{1}{2}\ln 13+i\left(-\arctan\frac{3}{2}\right)$$
$$=1.282475-i(.982794).$$

Example 8.

Compute $(.227)^{.69}$ to 7D.
Using **4.2.7** and **Tables 4.2** and **4.4,**

$$(.227)^{.69}=e^{.69\ln(.227)}=e^{.69(-1.48280\ 5262)}$$
$$=e^{-1.02313\ 5631}=.35946\ 60.$$

Example 9.

Compute $e^{4.99728\ 69}$ to 7S.
Using **4.2.18** and **Table 4.4,**

$$e^{4.99728\ 69}=e^{4.9}e^{.09728\ 69}.$$

Linear interpolation gives $e^{.09728\ 69}=1.10217\ 6$ with an error of 1×10^{-7},

$$e^{4.99728\ 69}=(134.28978)(1.10217\ 67)=148.0111.$$

Example 10.

Compute e^x to 18D for
$$x=.86725\ 13489\ 24685\ 12693.$$

Let $a=x-.867$. Using **4.2.1,** compute successively

$$1.00000\ 00000\ 00000\ 00000$$
$$a=\ .00025\ 13489\ 24685\ 12693$$
$$\frac{a^2}{2!}=\ .\qquad 315\ 88140\ 97019$$
$$\frac{a^3}{3!}=\ .\qquad 2646\ 54842$$
$$\frac{a^4}{4!}=\ .\qquad 16630$$
$$e^a=1.00025\ 13805\ 15472\ 81184$$
$$e^{.867}=2.37976\ 08513\ 29496\ 863 \text{ from } \textbf{Table 4.}$$
$$e^ae^{.867}=e^x=2.38035\ 90768\ 39006\ 089.$$

Example 11.

Compute e^{648} to 7S.

Let $n=\frac{x}{\ln 10}$ and $d=$the decimal part of $\frac{x}{\ln 10}$.
Then

$$\exp x=\exp\left(\frac{x}{\ln 10}\ln 10\right)=\exp[(n+d)\ln 10]$$
$$=\exp(\ln 10^n)\exp(d\ln 10)$$
$$=10^n\exp(d\ln 10)$$

From **Table 4.4**

$$e^{648}=\exp\left(\frac{648}{\ln 10}\ln 10\right)=\exp(281.42282\ 42\ln 10)$$
$$=10^{281}\exp(.42282\ 42\ln 10)=10^{281}\exp .97358\ 8'$$
$$=10^{281}(2.647428)=(281)2.647428.$$

Example 12.

Compute e^{-x} for $x=.75$ using the expansion i1 Chebyshev polynomials.