1.2.11.

$$\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots$$

$$\ln(1-x) = -x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} + \cdots$$

$$\ln\left(\frac{1+x}{1-x}\right) = \ln(1+x) - \ln(1-x) = 2\left[x + \frac{x^3}{3} + \frac{x^5}{5} + \cdots\right] = 2\sum_{k=1}^{\infty} \frac{x^{2k-1}}{2k-1}$$

1.2.12.

$$\ln 2 = \ln\left(\frac{1+\frac{1}{3}}{1-\frac{1}{3}}\right) = 2\left[3^{-1} + \frac{3^{-3}}{3} + \frac{3^{-5}}{5} + \cdots\right] \approx 0.69313 (4 \text{ terms})$$

If we take 10 terms and denote the error by E, then

$$\ln 2 = 2\left[3^{-1} + \frac{3^{-3}}{3} + \cdots + \frac{3^{-19}}{19}\right] + E$$

$$E = 2\left[\frac{3^{-21}}{21} + \frac{3^{-23}}{23} + \cdots\right]$$

$$< \frac{2}{20}3^{-21}\left[1 + \frac{1}{9} + \left(\frac{1}{9}\right)^2 + \cdots\right] = \frac{2}{20}3^{-21}\frac{1}{1-\frac{1}{9}} \approx 1.08 \times 10^{-11}$$

1.2.16. Obvious

1.2.30.

$$\cos x = \cos\frac{5\pi}{6} - \left(x - \frac{5\pi}{6}\right)\sin\frac{5\pi}{6} + \cdots \approx -\frac{\sqrt{3}}{2} - \frac{1}{2}\left(x - \frac{5\pi}{6}\right)$$