

Quiz 1.

1. ① $\pm 1, a_1 a_2 \dots a_s \times 2^e$

$$\pm 1 \rightarrow s: 1 \text{ bit}$$

$$-6 \leq e = c-6 \leq 7 \Rightarrow 0 \leq c \leq 13 < 2^4-1 \Rightarrow c: 4 \text{ bits}$$

$$s=11 \rightarrow f: 11 \text{ bits.}$$

$$\therefore \text{Need } 1+4+11=16 \text{ bits. \#}$$

② $-0.6875 = (-0.1011)_2 = (-1.011 \times 2^{-1})_2$ #

2. $s=11, \Rightarrow \epsilon_M = 2^{-s} = 2^{-11}$ #

3. format long

$$x_1 = \frac{2^{100} - \sqrt{2^{100} - 4}}{2} = \frac{2}{2^{100} + \sqrt{2^{100} - 4}} = 4.761905841702249e^{-04} \quad (\text{Can be checked by 小算盤})$$
 #

$$x_2 = \frac{2^{100} + \sqrt{2^{100} - 4}}{2} = 2.099999523809416e^{+03}$$
 #

4. $\bar{z}^2 = \frac{10}{3} \bar{z} - 1 \Rightarrow \bar{z} = \frac{1}{3}, 3. \Rightarrow P_n = C_1 \left(\frac{1}{3}\right)^n + C_2 3^n$

$$\begin{cases} P_0 = C_1 + C_2 = 1 \\ P_1 = C_1 \frac{1}{3} + C_2 3 = \frac{1}{3} \end{cases} \Rightarrow C_1 = 1, C_2 = 0. \Rightarrow P_n = \left(\frac{1}{3}\right)^n$$
 #

$$e_n \approx d_1 \left(\frac{1}{3}\right)^n + d_2 3^n$$

$$\begin{cases} e_0 = d_1 + d_2 = 0 \\ e_1 = d_1 \frac{1}{3} + d_2 3 = \frac{1}{3} \delta > 0 \end{cases} \Rightarrow d_2 = \frac{\delta}{8} \neq 0 \Rightarrow e_n \approx d_2 3^n \Rightarrow \text{unstable}$$
 #

$$d_1 + P d_2 = \delta \quad (\because P_1 = \frac{1}{3})$$

5. Nested manner.

① $\sum_{i=0}^p \frac{x^i}{i!} = ((((((\frac{x}{p!} + \frac{1}{8!}) \times \frac{1}{7!}) \times \frac{1}{6!}) \times \frac{1}{5!}) \times \frac{1}{4!}) \times \frac{1}{3!}) \times \frac{1}{2!}) \times \frac{1}{1!} \times \frac{1}{0!}$

$$+ : \underline{9} \quad * : (1+2+\dots+8) + 8 = 44. \quad / : 10+1=11$$
 #

$$2! \quad p! \quad p! \quad \frac{1}{p!} \times \frac{x}{p!} ? \quad \frac{1}{p!} \dots \frac{1}{0!} \quad \frac{1}{3}$$

$$0! = 1! = 1 \text{ def?}$$

$$\frac{1}{p!} x = \frac{x}{p!} ?$$

$$\frac{1}{0!} = 1? \quad \frac{1}{1!} = 1?$$

② See code. 0.006P54 #

effici.

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