Norbert Matuška

①

$$\left(\frac{n}{(n-2)!} - \frac{2}{(n-1)!}\right) \cdot \frac{(n-1)}{(n+1)}$$

$$\left(\frac{n}{(n-2)!} - \frac{2}{(n-1)\cdot(n-2)!}\right) \cdot \frac{(n-1)}{(n+1)}$$

$$\frac{n\cdot(n-1)-2}{(n-1)\cdot(n-2)!} \cdot \frac{n-1}{n+1}$$

$$\frac{n^2-n-2}{(n-2)!\cdot(n-1)} \cdot \frac{n-1}{n+1}$$

$$\frac{n^2+n-2n-2}{(n-1)!} \cdot \frac{n-1}{n+1}$$

$$\frac{(n+1)\cdot(n-2)}{(n-2)\cdot(n-3)!} \cdot \frac{1}{n+1}$$

$$\frac{1}{(n-3)!}$$

④

$$\binom{n}{3} + \binom{n+2}{3} - \binom{n+1}{3} = \frac{5n^2-n}{6}$$

$$\frac{n!}{(n-k)!\cdot k!}$$

$$\frac{n!}{(n-3)!\cdot 3!} + \frac{(n+2)!}{(n+2-3)!\cdot 3!} - \frac{(n+1)!}{(n+1-3)!\cdot 3!}$$

$$\frac{n\cdot(n-1)\cdot(n-2)\cdot(n-3)!}{(n-3)!\cdot 3!} + \frac{(n+2)\cdot(n+1)\cdot n\cdot(n-1)!}{(n-1)!\cdot 3} - \frac{(n+1)\cdot n\cdot(n-1)\cdot(n-2)!}{(n-2)!\cdot 3!}$$

$$\frac{(n^2-n)\cdot(n-2)}{3!} + \frac{(n^2+2n)\cdot(n+1)}{3!} - \frac{(n^2-1)\cdot n}{3!}$$

$$\frac{n^3-2n^2-n^2+2n}{3!} + \frac{n^3+n^2+2n^2+2n}{3!} - \frac{n^3-n}{3}$$

$$\frac{n^3-3n^2+2n + n^3+3n^2+2n-(n^3-n)}{3!}$$

$$\frac{n^3+2n+n^3+2n-n^3+n}{6}$$

$$\frac{5n+n^3}{6} = \frac{5n^2-n}{6}$$

$$5n+n^3-5n^2+n=0$$

$$n\cdot(n^2-5n+6)=0$$

$$n\cdot(n\cdot(n-2)-3\cdot(n-2))=0$$

$$n\cdot(n-2)\cdot(n-3)=0$$

$$n=0 \qquad n=0$$
$$\qquad\qquad n=2$$
$$n-2=0 \qquad n=3$$
$$n-3=0$$

$$\boxed{n=3}$$

$$\left(\frac{3}{x}+\sqrt{x}\right)^9$$

$$\binom{9}{0}\left(\frac{3}{x}\right)^9\left(\sqrt{x}\right)^0 + \binom{9}{1}\left(\frac{3}{x}\right)^8\cdot\left(\sqrt{x}\right)^1 + \binom{9}{2}\left(\frac{3}{x}\right)^7\cdot x \quad \binom{9}{3}\left(\frac{3}{x}\right)^6\cdot\left(\sqrt{x}\right)^3 \cdot$$

$$\binom{9}{4}\left(\frac{3}{x}\right)^5\left(\sqrt{x}\right)^4 + \binom{9}{5}\left(\frac{3}{x}\right)^4\cdot\left(\sqrt{x}\right)^5 + \binom{9}{6}\left(\frac{3}{x}\right)^3\cdot\left(\sqrt{x}\right)^6$$

$$\frac{9!}{(9-6)!\,6!}\left(\frac{3}{x}\right)^3$$

7.

Siedmy člen

$$\left(3x^{-1}\right)^3$$

$$3\left[x^{-3}\right]$$

⑥ $71 \Rightarrow ?_2$

$71 : 2 = 35 \quad zv.\ 1$

$35 : 2 = 17 \quad zv.\ 1$

$17 : 2 = 8 \quad zv.\ 1$

$8 : 2 = 4 \quad zv.\ 0$

$4 : 2 = 2 \quad zv.\ 0$

$2 : 2 = 1 \quad zv.\ 0$

$1 : 2 = 0 \quad zv.\ 1$

$-\ 1010010$
$01\ 01101_{1k}$

$1000\ 1111$
$+\ 0101101$
$\overline{1110100}_{1k}$

$-\ 0001011$

$82 \rightarrow ?_2$

$82 : 2 = 41 \quad zv.\ 0$

$41 : 2 = 20 \quad zv.\ 1$

$20 : 2 = 10 \quad zv.\ 0$

$10 : 2 = 5 \quad zv.\ 0$

$5 : 2 = 2 \quad zv.\ 1$

$2 : 2 = 1 \quad zv.\ 0$

$1 : 2 = 0 \quad zv.\ 1$

$a_2 + a_4 = -30$

$a_3 = a_1 \cdot q^2$

$a_4 = a_1 \cdot q^3$

$a_2 = a_1 \cdot q$

$a_1 \cdot q + a_1 \cdot q^3 = -30$

$a_1 \cdot (q + q^3) = -30$

$\dfrac{15}{1+q^2} \cdot (q + q^3) = -30$

$\dfrac{15}{1+q^2} \cdot q \cdot (1 + q^2) = -30$

$15q = -30$

$q = -2$

$a_1 = \dfrac{15}{1+(-2)^2}$

$a_1 = 3$

$S_7 = 3 \cdot \dfrac{1+2^7}{1+2}$

$S_7 = 3 \cdot \dfrac{129}{3}$

$S_7 = 129$

(10) $d = -3$

$a_n = -3$

$S_n = 42$

$S_n = \dfrac{a_1 + a_n}{2} \cdot n$

$42 = \dfrac{a_1 + (-3)}{2} \cdot n$

$a_{n+1} = -3 - 3$

$a_{n+1} = -6$

$a_n = a_1 + (n-1) \cdot d$

$-3 = a_1 + (n-1) \cdot -3$

$-a_1 = -3n + 3 + 3$

$a_1 = 3n - 6$

$42 = \dfrac{(3n-6)-3}{2} \cdot n$

$42 = \dfrac{3n - 9}{2} \cdot n$

$42 = \dfrac{n \cdot (3n - 9)}{2}$

$84 = 3n^2 - 9 \qquad |:3$

$28 = n^2 - 3n$

$28 - n^2 + 3n = 0$

$n^2 - 3n - 28$

$n^2 + 4n - 7n - 28 = 0$

$(n+4) \cdot (n-7) = 0$

$\dfrac{n = +7}{n = -4} \qquad n > 0$

$a_1 = 3n - 6$

$a_1 = 3 \cdot 7 - 6$

$a_1 = 15$

⑦ 47723_5

$3 \cdot 5^0 = 3$

$2 \cdot 5^1 = 10$

$1 \cdot 5^2 = 25$

$1 \cdot 5^3 = 125$

$4 \cdot 5^4 = 2500$

$\overline{2663_{10}} \to \quad :11$

$2663 : 11 = 242 \quad Zv. 1$

$242 : 11 = 22 \quad Zv. 0$

$22 : 11 = 2 \quad Zv. 0$

$2 : 11 = 0 \quad Zv. 2$

70773_8

$3 \cdot 8^0 = 3$

$7 \cdot 8 = 56$

$1 \cdot 8^2 = 64$

$0 \cdot 8^3 = 0$

$7 \cdot 8^4 = 28672$

$\overline{28795} \to \, ?^2 \, 11$

$28795 : 11 = 2617 \quad Zv. 8$

$2617 : 11 = 237 \quad Zv. 10$

$237 : 11 = 21 \quad Zv. 6$

$21 : 11 = 1 \quad Zv. 10$

$1 : 11 = 0 \quad Zv. 1$

$2001_{11} + 1A6A8_{11} =$

$1A6A8$

$\overline{216A9}$

⑧

$$\left\{ \frac{4}{2^h + 2} \right\}_{h=1}^{\infty}$$

$$\frac{1}{4}$$

(3) $p'(h) = \quad h!$

$$\frac{12!}{4! \cdot 4! \cdot 4! \cdot 4!}$$

$$\frac{V'_4(12) = \cancel{4!!} \cdot \boxed{12^4}}{\cancel{V=3t} \atop 2 = 8}$$

12^4

$2^3 \, | \, 2x$

(2) $\quad 2^3 = 8 \qquad \quad 8 \cdot 2 = 16$

$\quad\quad 2^4 = 16$