## Diagram for the computation by the Engine of the Numbers of Bernoulli. See Note G. (page 722 *et seq.*)

| Number of Operation. | Nature of Operation. | Variables acted upon. | Variables receiving results. | Indication of change in the value on any Variable. | Statement of Results. | Data. $^1V_1$ ○ 0 0 0 1 [1] | $^1V_2$ ○ 0 0 0 2 [2] | $^1V_3$ ○ 0 0 0 4 [n] | Working Variables. $^0V_4$ ○ 0 0 0 0 | $^0V_5$ ○ 0 0 0 0 | $^0V_6$ ○ 0 0 0 0 | $^0V_7$ ○ 0 0 0 0 | $^0V_8$ ○ 0 0 0 0 | $^0V_9$ ○ 0 0 0 0 | $^0V_{10}$ ○ 0 0 0 0 | $^0V_{11}$ ○ 0 0 0 0 | $^0V_{12}$ ○ 0 0 0 0 | $^0V_{13}$ ○ 0 0 0 0 | Result Variables. $^1V_{21}$ ○ 0 0 0 0 $B_1$ in a decimal fraction. [$B_1$] | $^1V_{22}$ ○ 0 0 0 0 $B_3$ in a decimal fraction. [$B_3$] | $^1V_{23}$ ○ 0 0 0 0 $B_5$ in a decimal fraction. [$B_5$] | $^0V_{24}$... ○ 0 0 0 0 [$B_7$] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | × | $^1V_2 \times {}^1V_3$ | $^1V_4, {}^1V_5, {}^1V_6$ | $\left\{\begin{array}{l}{}^1V_2 = {}^1V_2\\ {}^1V_3 = {}^1V_3\end{array}\right\}$ | $= 2n$ | ... | 2 | $n$ | $2n$ | $2n$ | $2n$ | | | | | | | | | | | |
| 2 | − | $^1V_4 - {}^1V_1$ | $^2V_4$ | $\left\{\begin{array}{l}{}^1V_4 = {}^2V_4\\ {}^1V_1 = {}^1V_1\end{array}\right\}$ | $= 2n - 1$ | 1 | ... | ... | $2n - 1$ | | | | | | | | | | | | | |
| 3 | + | $^1V_5 + {}^1V_1$ | $^2V_5$ | $\left\{\begin{array}{l}{}^1V_5 = {}^2V_5\\ {}^1V_1 = {}^1V_1\end{array}\right\}$ | $= 2n + 1$ | 1 | ... | ... | ... | $2n + 1$ | | | | | | | | | | | | |
| 4 | ÷ | $^2V_5 \div {}^2V_4$ | $^1V_{11}$ | $\left\{\begin{array}{l}{}^2V_5 = {}^0V_5\\ {}^2V_4 = {}^0V_4\end{array}\right\}$ | $= \frac{2n-1}{2n+1}$ | ... | ... | ... | 0 | 0 | ... | ... | ... | ... | ... | $\frac{2n-1}{2n+1}$ | | | | | | |
| 5 | ÷ | $^1V_{11} \div {}^1V_2$ | $^2V_{11}$ | $\left\{\begin{array}{l}{}^1V_{11} = {}^2V_{11}\\ {}^1V_2 = {}^1V_2\end{array}\right\}$ | $= \frac{1}{2} \cdot \frac{2n-1}{2n+1}$ | ... | 2 | ... | ... | ... | ... | ... | ... | ... | ... | $\frac{1}{2} \cdot \frac{2n-1}{2n+1}$ | | | | | | |
| 6 | − | $^0V_{13} - {}^2V_{11}$ | $^1V_{12}$ | $\left\{\begin{array}{l}{}^0V_{13} = {}^1V_{13}\\ {}^2V_{11} = {}^0V_{11}\end{array}\right\}$ | $= -\frac{1}{2} \cdot \frac{2n-1}{2n+1} = A_0$ | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 0 | ..... | $-\frac{1}{2} \cdot \frac{2n-1}{2n+1} = A_0$ | | | | |
| 7 | − | $^1V_3 - {}^1V_1$ | $^1V_{10}$ | $\left\{\begin{array}{l}{}^1V_3 = {}^1V_3\\ {}^1V_1 = {}^1V_1\end{array}\right\}$ | $= n - 1\ (= 3)$ | 1 | ... | $n$ | ... | ... | ... | ... | ... | ... | $n - 1$ | | | | | | | |
| 8 | + | $^1V_2 + {}^0V_7$ | $^1V_7$ | $\left\{\begin{array}{l}{}^1V_2 = {}^1V_2\\ {}^0V_7 = {}^1V_7\end{array}\right\}$ | $= 2 + 0 = 2$ | ... | 2 | ... | ... | ... | ... | 2 | | | | | | | | | | |
| 9 | + | $^1V_6 + {}^1V_7$ | $^2V_{11}$ | $\left\{\begin{array}{l}{}^1V_6 = {}^2V_6\\ {}^0V_{11} = {}^2V_{11}\end{array}\right\}$ | $= \frac{2n}{2} = A_1$ | ... | ... | ... | ... | ... | $2n$ | 2 | ... | ... | ... | $\frac{2n}{2} = A_1$ | | | | | | |
| 10 | × | $^1V_{21} \times {}^2V_{11}$ | $^1V_{12}$ | $\left\{\begin{array}{l}{}^1V_{21} = {}^1V_{21}\\ {}^2V_{11} = {}^2V_{11}\end{array}\right\}$ | $= B_1 \cdot \frac{2n}{2} = B_1 A_1$ | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | $\frac{2n}{2} = A_1$ | $B_1 \cdot \frac{2n}{2} = B_1 A_1$ | ..... | $B_1$ | | | |
| 11 | + | $^1V_{12} + {}^1V_{13}$ | $^2V_{13}$ | $\left\{\begin{array}{l}{}^1V_{12} = {}^0V_{12}\\ {}^1V_{13} = {}^2V_{13}\end{array}\right\}$ | $= -\frac{1}{2} \cdot \frac{2n-1}{2n+1} + B_1 \cdot \frac{2n}{2}$ | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ..... | 0 | $\left\{-\frac{1}{2} \cdot \frac{2n-1}{2n+1} + B_1 \cdot \frac{2n}{2}\right\}$ | | | | |
| 12 | − | $^1V_{10} - {}^1V_1$ | $^2V_{10}$ | $\left\{\begin{array}{l}{}^1V_{10} = {}^2V_{10}\\ {}^1V_1 = {}^1V_1\end{array}\right\}$ | $= n - 2\ (= 2)$ | 1 | ... | ... | ... | ... | ... | ... | ... | ... | $n - 2$ | | | | | | | |
| 13 | − | $^1V_6 - {}^1V_1$ | $^2V_6$ | $\left\{\begin{array}{l}{}^1V_6 = {}^2V_6\\ {}^1V_1 = {}^1V_1\end{array}\right\}$ | $= 2n - 1$ | 1 | ... | ... | ... | ... | $2n - 1$ | | | | | | | | | | | |
| 14 | + | $^1V_1 + {}^1V_2$ | $^2V_7$ | $\left\{\begin{array}{l}{}^1V_1 = {}^1V_1\\ {}^1V_7 = {}^2V_7\end{array}\right\}$ | $= 2 + 1 = 3$ | 1 | ... | ... | ... | ... | ... | 3 | | | | | | | | | | |
| 15 | ÷ | $^2V_6 \div {}^2V_2$ | $^1V_8$ | $\left\{\begin{array}{l}{}^2V_6 = {}^2V_6\\ {}^2V_2 = {}^2V_2\end{array}\right\}$ | $= \frac{2n-1}{3}$ | ... | ... | ... | ... | ... | $2n - 1$ | 3 | $\frac{2n-1}{3}$ | | | | | | | | | |
| 16 | × | $^1V_8 \times {}^2V_{11}$ | $^4V_{11}$ | $\left\{\begin{array}{l}{}^1V_8 = {}^0V_8\\ {}^2V_{11} = {}^4V_{11}\end{array}\right\}$ | $= \frac{2n}{2} \cdot \frac{2n-1}{3}$ | ... | ... | ... | ... | ... | ... | ... | 0 | ... | ... | $\frac{2n}{2} \cdot \frac{2n-1}{3}$ | | | | | | |
| 17 | − | $^2V_6 - {}^1V_1$ | $^3V_6$ | $\left\{\begin{array}{l}{}^2V_6 = {}^3V_6\\ {}^1V_1 = {}^1V_1\end{array}\right\}$ | $= 2n - 2$ | 1 | ... | ... | ... | ... | $2n - 2$ | | | | | | | | | | | |
| 18 | + | $^1V_1 + {}^3V_2$ | $^3V_7$ | $\left\{\begin{array}{l}{}^1V_1 = {}^1V_1\\ {}^3V_2 = {}^3V_7\end{array}\right\}$ | $= 3 + 1 = 4$ | 1 | ... | ... | ... | ... | ... | 4 | | | | | | | | | | |
| 19 | ÷ | $^3V_6 \div {}^3V_7$ | $^1V_9$ | $\left\{\begin{array}{l}{}^3V_6 = {}^3V_6\\ {}^3V_7 = {}^3V_7\end{array}\right\}$ | $= \frac{2n-2}{4}$ | ... | ... | ... | ... | ... | $2n - 2$ | 4 | ... | $\frac{2n-2}{4}$ | | $\left\{\frac{2n}{2} \cdot \frac{2n-1}{3} \cdot \frac{2n-2}{3}\right\} = A_2$ | | | | | | |
| 20 | × | $^1V_9 \times {}^4V_{11}$ | $^5V_{11}$ | $\left\{\begin{array}{l}{}^1V_9 = {}^0V_9\\ {}^4V_{11} = {}^5V_{11}\end{array}\right\}$ | $= \frac{2n}{2} \cdot \frac{2n-1}{3} \cdot \frac{2n-2}{4} = A_3$ | ... | ... | ... | ... | ... | ... | ... | ... | 0 | ... | | | | | | | |
| 21 | × | $^1V_{22} \times {}^5V_{11}$ | $^0V_{12}$ | $\left\{\begin{array}{l}{}^1V_{22} = {}^1V_{22}\\ {}^0V_{12} = {}^0V_{12}\end{array}\right\}$ | $= B_3 \cdot \frac{2n}{2} \cdot \frac{2n-1}{3} \cdot \frac{2n-2}{3} = B_3 A_2$ | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 0 | $B_3 A_2$ | ..... | ..... | $B_3$ | | |
| 22 | + | $^2V_{12} + {}^2V_{13}$ | $^3V_{13}$ | $\left\{\begin{array}{l}{}^2V_{12} = {}^2V_{12}\\ {}^2V_{13} = {}^3V_{13}\end{array}\right\}$ | $= A_0 + B_1 A_1 + B_3 A_3$ | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ..... | 0 | $\left\{A_3 + B_1 A_1 + B_3 A_3\right\}$ | | | | |
| 23 | − | $^2V_{10} - {}^1V_1$ | $^3V_{10}$ | $\left\{\begin{array}{l}{}^2V_{10} = {}^3V_{10}\\ {}^1V_1 = {}^1V_1\end{array}\right\}$ | $= n - 3\ (= 1)$ | 1 | ... | ... | ... | ... | ... | ... | ... | ... | $n - 3$ | | | | | | | |
| | | | | | Here follows a repetition of Operations thirteen to twenty-three. | | | | | | | | | | | | | | | | | |
| 24 | + | $^4V_{13} + {}^0V_{24}$ | $^1V_{24}$ | $\left\{\begin{array}{l}{}^4V_{13} = {}^0V_{13}\\ {}^0V_{24} = {}^1V_{24}\end{array}\right\}$ | $= B_7$ | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ..... | ..... | ..... | ..... | ..... | ..... | $B_7$ |
| 25 | + | $^1V_1 + {}^1V_3$ | $^1V_3$ | $\left\{\begin{array}{l}{}^1V_1 = {}^1V_1\\ {}^1V_3 = {}^1V_3\\ {}^4V_6 = {}^0V_6\\ {}^4V_7 = {}^0V_7\end{array}\right\}$ | $= n + 1 = 4 + 1 = 5$ by a Variable-card. by a Variable card. | 1 | ... | $n + 1$ | ... | ... | 0 | 0 | | | | | | | | | | |