Augusta Ada King, Countess of Lovelace

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Ada Lovelace
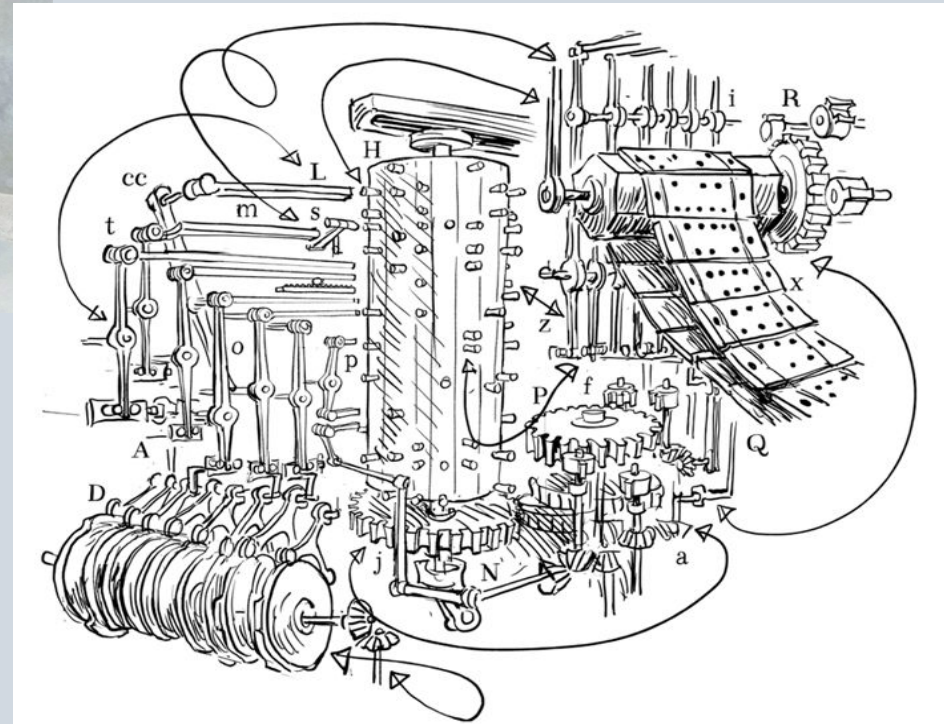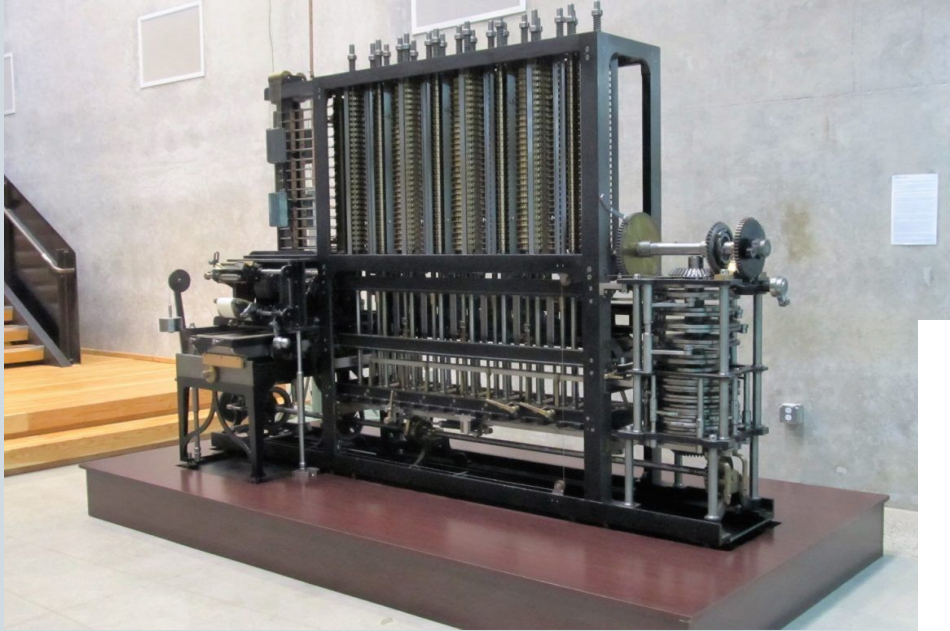
Born: December 10, 1815

Died: November 27, 1852

She was a mathematician

She was born in London, United Kingdom

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

Number of Operations.	Nature of Operation.	Variables acted upon.	Variables receiving results.	Indication of change in the value on any Variable.	Statement of Results.	Data ${}^{1}V_1$ (1)	${}^{1}V_2$ (2)	${}^{1}V_3$ (4)	Working Variables ${}^{0}V_4$	${}^{0}V_5$	${}^{0}V_6$	${}^{0}V_7$	${}^{0}V_8$	${}^{0}V_9$	${}^{0}V_{10}$	${}^{0}V_{11}$	${}^{0}V_{12}$	${}^{0}V_{13}$	Result Variables B_1	B_3	B_5	B_7
1	×	${}^{1}V_2 \times {}^{1}V_3$	${}^{1}V_4, {}^{1}V_5, {}^{1}V_6$	{ ${}^{1}V_2 = {}^{1}V_2$, ${}^{1}V_3 = {}^{1}V_3$ }	$= 2n$		2	n	2n	2n	2n											
2	−	${}^{1}V_4 - {}^{1}V_1$	${}^{2}V_4$	{ ${}^{1}V_4 = {}^{1}V_4$, ${}^{1}V_1 = {}^{1}V_1$ }	$= 2n - 1$	1			$2n-1$													
3	+	${}^{1}V_5 + {}^{1}V_1$	${}^{2}V_5$	{ ${}^{1}V_5 = {}^{1}V_5$, ${}^{1}V_1 = {}^{1}V_1$ }	$= 2n + 1$	1				$2n+1$												
4	÷	${}^{2}V_5 ÷ {}^{2}V_4$	${}^{1}V_{11}$	{ ${}^{2}V_5 = {}^{1}V_5$, ${}^{2}V_4 = {}^{1}V_4$ }	$= \dfrac{2n-1}{2n+1}$				0	0							$\dfrac{2n-1}{2n+1}$					
5	÷	${}^{1}V_{11} ÷ {}^{1}V_2$	${}^{2}V_{11}$	{ ${}^{1}V_{11} = {}^{2}V_{11}$, ${}^{1}V_2 = {}^{1}V_2$ }	$= \dfrac{1}{2} \cdot \dfrac{2n-1}{2n+1}$		2										$\dfrac{1}{2}\cdot\dfrac{2n-1}{2n+1}$					
6	−	${}^{1}V_{13} - {}^{1}V_{11}$	${}^{1}V_{13}$	{ ${}^{2}V_{11} = {}^{2}V_{11}$, ${}^{1}V_{13} = {}^{1}V_{13}$ }	$= -\dfrac{1}{2}\cdot\dfrac{2n-1}{2n+1} = A_0$												0		$-\dfrac{1}{2}\cdot\dfrac{2n-1}{2n+1}=A_0$			
7	−	${}^{1}V_3 - {}^{1}V_1$	${}^{1}V_{10}$	{ ${}^{1}V_3 = {}^{1}V_3$, ${}^{1}V_1 = {}^{1}V_1$ }	$= n - 1 (= 3)$	1		n							$n-1$							
8	+	${}^{1}V_2 + {}^{0}V_7$	${}^{1}V_7$	{ ${}^{1}V_2 = {}^{1}V_2$, ${}^{0}V_7 = {}^{1}V_7$ }	$= 2 + 0 = 2$		2					2										
9	+	${}^{1}V_6 + {}^{1}V_7$	${}^{2}V_{11}$	{ ${}^{1}V_6 = {}^{1}V_6$, ${}^{1}V_7 = {}^{2}V_7$ }	$= \dfrac{2n}{2} = A_1$						2n	2					$\dfrac{2n}{2}=A_1$					
10	×	${}^{1}V_{21} \times {}^{1}V_{11}$	${}^{1}V_{12}$	{ ${}^{1}V_{21} = {}^{1}V_{21}$, ${}^{2}V_{11} = {}^{2}V_{11}$ }	$= B_1 \cdot \dfrac{2n}{2} = B_1 A_1$												$\dfrac{2n}{2}=A_1$	$B_1\cdot\dfrac{2n}{2}=B_1A_1$		B_1		
11	+	${}^{1}V_{12} + {}^{1}V_{13}$	${}^{2}V_{13}$	{ ${}^{1}V_{12} = {}^{0}V_{12}$, ${}^{1}V_{13} = {}^{2}V_{13}$ }	$= -\dfrac{1}{2}\cdot\dfrac{2n-1}{2n+1} + B_1\cdot\dfrac{2n}{2}$													0	$\left\{-\dfrac{1}{2}\cdot\dfrac{2n-1}{2n+1}+B_1\cdot\dfrac{2n}{2}\right\}$			
12	−	${}^{1}V_{10} - {}^{1}V_1$	${}^{2}V_{10}$	{ ${}^{1}V_{10} = {}^{2}V_{10}$, ${}^{1}V_1 = {}^{1}V_1$ }	$= n - 2 (= 2)$	1									$n-2$							
13	−	${}^{1}V_6 - {}^{1}V_1$	${}^{2}V_6$	{ ${}^{1}V_6 = {}^{2}V_6$, ${}^{1}V_1 = {}^{1}V_1$ }	$= 2n - 1$	1					$2n-1$											
14	+	${}^{1}V_1 + {}^{2}V_7$	${}^{2}V_7$	{ ${}^{1}V_1 = {}^{1}V_1$, ${}^{2}V_7 = {}^{2}V_7$ }	$= 2 + 1 = 3$	1						3										
15	÷	${}^{2}V_6 ÷ {}^{2}V_7$	${}^{1}V_8$	{ ${}^{2}V_6 = {}^{2}V_6$, ${}^{2}V_7 = {}^{2}V_7$ }	$= \dfrac{2n-1}{3}$						$2n-1$	3	$\dfrac{2n-1}{3}$									
16	×	${}^{1}V_8 \times {}^{3}V_{11}$	${}^{3}V_{11}$	{ ${}^{1}V_8 = {}^{1}V_8$, ${}^{3}V_{11} = {}^{3}V_{11}$ }	$= \dfrac{2n}{2}\cdot\dfrac{2n-1}{3}$								0				$\dfrac{2n}{2}\cdot\dfrac{2n-1}{3}$					
17	−	${}^{2}V_6 - {}^{1}V_1$	${}^{3}V_6$	{ ${}^{2}V_6 = {}^{3}V_6$, ${}^{1}V_1 = {}^{1}V_1$ }	$= 2n - 2$	1					$2n-2$											
18	+	${}^{1}V_1 + {}^{2}V_7$	${}^{3}V_7$	{ ${}^{1}V_1 = {}^{1}V_1$, ${}^{2}V_7 = {}^{3}V_7$ }	$= 3 + 1 = 4$	1						4										
19	÷	${}^{3}V_6 ÷ {}^{3}V_7$	${}^{1}V_9$	{ ${}^{3}V_6 = {}^{3}V_6$, ${}^{3}V_7 = {}^{3}V_7$ }	$= \dfrac{2n-2}{4}$						$2n-2$	4		$\dfrac{2n-2}{4}$								
20	×	${}^{1}V_9 \times {}^{3}V_{11}$	${}^{4}V_{11}$	{ ${}^{1}V_9 = {}^{1}V_9$, ${}^{4}V_{11} = {}^{4}V_{11}$ }	$= \dfrac{2n}{2}\cdot\dfrac{2n-1}{3}\cdot\dfrac{2n-2}{4} = A_3$									0			$\left\{\dfrac{2n}{2}\cdot\dfrac{2n-1}{3}\cdot\dfrac{2n-2}{4}=A_3\right\}$					
21	×	${}^{1}V_{22} \times {}^{4}V_{11}$	${}^{3}V_{12}$	{ ${}^{1}V_{22} = {}^{1}V_{22}$, ${}^{4}V_{11} = {}^{4}V_{11}$ }	$= B_3\cdot\dfrac{2n}{2}\cdot\dfrac{2n-1}{3}\cdot\dfrac{2n-2}{4}=B_3A_3$												0	B_3A_3		B_3		
22	+	${}^{2}V_{12} + {}^{2}V_{13}$	${}^{3}V_{13}$	{ ${}^{2}V_{12} = {}^{0}V_{12}$, ${}^{2}V_{13} = {}^{3}V_{13}$ }	$= A_0 + B_1 A_1 + B_3 A_3$													0	$\left\{A_0 + B_1 A_1 + B_3 A_3\right\}$			
23	−	${}^{3}V_{10} - {}^{3}V_1$	${}^{3}V_{10}$	{ ${}^{3}V_{10} = {}^{3}V_{10}$, ${}^{3}V_1 = {}^{1}V_1$ }	$= n - 3 (= 1)$	1									$n-3$							

Here follows a repetition of Operations thirteen to twenty-three.

| 24 | + | ${}^{4}V_{13} + {}^{0}V_{24}$ | ${}^{1}V_{24}$ | { ${}^{4}V_{13} = {}^{0}V_{13}$, ${}^{0}V_{24} = {}^{1}V_{24}$ } | $= B_7$ | | | | | | | | | | | | | | | | | B_7 |
| 25 | + | ${}^{1}V_1 + {}^{1}V_3$ | ${}^{1}V_3$ | { ${}^{1}V_3 = {}^{1}V_3$, ${}^{1}V_1 = {}^{1}V_1$, ${}^{4}V_6 = {}^{0}V_6$, ${}^{4}V_7 = {}^{0}V_7$ } | $= n + 1 = 4 + 1 = 5$ ... by a Variable-card. by a Variable-card. | 1 | | n+1 | | | 0 | 0 | | | | | | | | | | |

Difference engine, first created by Charles Babbage

Thank you for attention!