

The solution by William D. Jackson alluded to shows:

The number of Fibonacci numbers not greater than N is the greatest integer less than

$$\frac{\log \left[ \left( N + \frac{1}{2} \right) \sqrt{5} \right]}{\log \left( \frac{1 + \sqrt{5}}{2} \right)} - 1 .$$

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A FIBONACCI CROSSWORD PUZZLE

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1		2		3			4		5	6		7
8								9		10	11	
				12	13			14			15	
16				17				18			19	
					20			21				22
23	24	25			26			27				
28					29	30				31		
32					33				34			35
				36	37						38	
	39	40								41		42
43					44				45			46
					47			48			49	
50									51			

## ACROSS

- 2 A kind of number discovered by 17 Down of 22 Down while studying 50 Across.
- 8 Series (French).
- 9 A river in Kansas and Missouri.
- 12 Smallest number into which each of two numbers will divide.
- 14 The smallest natural number (French).
- 15 One more than a perfect square.
- 16 Occurrence of Fibonacci numbers in nature.
- 20  $\lim_{n \rightarrow \infty} (1 + 1/n)^n$ .
- 21 Device sometimes used to generate random numbers.
- 23 Combining form of "Chinese".
- 26 Letter used to denote a famous number sequence.
- 27 Sign of differentiation.
- 28 Brother of Abel.
- 29 Iron.
- 31 The numbers 1, 3, 4, 7, 11, ... are \_\_\_\_\_ numbers.
- 32 Girl's name.
- 33 Measure of intelligence (they say).
- 35 Chemical element.
- 36  $F_{n+1} = F_n + F_{n-1}$  is an example.
- 39 Roman emperor.
- 41  $(e^x + e^{-x})/2$ .
- 43 Amateur.
- 44 Latin connective.
- 45 Utilizes.
- 46 Square root of minus one.
- 47 If  $n$  is a natural number, then  $n+1$  is the \_\_\_\_\_ natural number.
- 49 Bitter Vetch.
- 50 Studied in 1202 AD by 2 Across.
- 51 Throws out.

## DOWN

- 1 The first degree.
- 2 Battle.
- 3 Famous mathematician who wrote novels under the nom de plume John Taine.
- 4 Definite article (Arabic).
- 5 Cone-shaped.
- 6 A form of the copula.
- 7 Base of the decimal system.
- 10 Preposition.
- 11 The function  $x(1 - x - x^2)^{-1}$  " \_\_\_\_\_ " the Fibonacci numbers.
- 13 In fact, a Fibonacci number is the \_\_\_\_\_ of  $x^n$  in the power series expansion of  $x(1 - x - x^2)^{-1}$ .
- 16 Discovered a famous triangle named after him. Known earlier to the Chinese.
- 17 Another name of 2 Across.
- 18 One of the simplest ways to combine numbers.
- 19 The numbers 1, 1, 2, 3, 5, 8, ... form a \_\_\_\_\_.
- 22 A town in Italy.
- 24 An adjectival suffix.
- 25 A famous game whose theory is based on the binary system.
- 30 What one usually does with 13 Down in order to discover a relation.
- 34 City in ancient Sumer.
- 37 Chemical element discovered in Ytterby, Sweden.
- 38 Abbreviation for a trigonometrical function; counterpart of 41 Across.
- 39 Man's nickname.
- 40 A person who might live near  $40^\circ\text{E}$ . Long.,  $22^\circ\text{N}$ . Lat.
- 42 To make a sharp sibilant sound.
- 43 Black substance obtained from coal.
- 45 An Indian of the Shoshonean tribes.
- 48 The Unknown Quantity.

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