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## Assignment 02

### FUNCTION

Define a function "volume" to compute the volume of a right circular cylinder of radius  $r$  and height  $h$ . Use it to compute the volume of a cylinder of radius 4 m and height 10 m.

Define a function "fac" to compute the factorial of a number. But avoid using "!", use instead "Product". Use this function to compute the factorial of 4, 5, and 6.

Define a function "fib" to compute any Fibonacci number. Find the 9th Fibonacci number.

### TABLE

The number  $e$  is defined as the limit of

$$(1 + 1/n)^n \text{ when } n \text{ approaches infinity.}$$

Use the Table function to list the value of  $(1 + 1/n)^n$  for  $n=10, 10^2, 10^3, \dots, 10^6$ . The numbers get closer and closer to  $e$ . [hint: replace  $n$  in the expression by  $10^k$  and let  $k$  go from 1 to 6]

In the list of random numbers:

ran = {0.115982, 0.915117, 0.27832, 0.190823, 0.440397, 0.076071, 0.733455, 0.0238866, 0.519024, 0.862353, 0.517789, 0.508546, 0.00592584, 0.63973, 0.087796, 0.914853, 0.852816, 0.50755, 0.019956, 0.0450688, 0.389318, 0.613672, 0.433074, 0.870317, 0.285534, 0.273034, 0.135192, 0.723829, 0.764315, 0.660089, 0.158247, 0.380149, 0.797884, 0.559137, 0.0662414, 0.205511, 0.757676, 0.228942, 0.643928, 0.514522, 0.559161, 0.628176, 0.0743335}

(i) What is the maximum value and its position?

- (ii) What is the minimum value and its position?
- (iii) How many entries are there in the list?
- (iv) Multiply the third element by the last one.
- (v) Sort the elements in increasing order.

Write a 5X5 matrix filled with random integers between 1 and 9.

Divide the element in the first row and third column by the element in the last row and in the last column.

Write a 7X7 diagonal matrix, whose diagonal elements are the first seven prime numbers.

What is the value of the sum of these elements?

Given the vectors

$$v1 = \{1, 2, 3\};$$

$$v2 = \{4, 5, 6\};$$

Compute the dot product between them.

Compute the cross product.

Given the matrices

$$m1 = \{ \{1, 2, 3\}, \{1, 2, 3\}, \{1, 2, 3\} \};$$

$$m2 = \{ \{9, 8, 7\}, \{6, 5, 4\}, \{3, 2, 1\} \};$$

Compute

\*)  $m1+m2$ ,  $m1-m2$ ,  $m1.m2$ ,

\*) the transpose of  $m1$ ,

\*) the determinant of  $m2$  (according to this result, will we have an inverse?),

\*) the trace of  $m2$