

ANM MATLAB introduction 9th September 2016

Exercise 1:

If we list all the natural numbers below 10 that are multiples of 3 or 5, we get 3, 5, 6 and 9. The sum of these multiples is 23.

Write a code that solves this for you

Tip: Make use of the following commands: *while*, *sum*

Exercise 2:

Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:

1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

2a.

Write a code that creates a vector with the first 15 elements of the Fibonacci sequence

Tip: Make use of the following commands: *for*

2b.

Continue with the code from 2a:

Write a code that changes all the numbers above 100 into 0

Exercise 3:

Write a script that calculates the sum of a geometric series with $N + 1$ terms, create a function that has both N and r as inputs, and finally gives S as output:

$$S = \sum_{i=0}^N r^i = 1 + r + r^2 + \dots + r^N$$

There are 2 ways to do this:

3a.

Find the sum of this geometric series using a for loop, for $N = 10$ and $r = 0.5$

3b.

Find the sum of this geometric series without using any for or while loops

Tip: Start by creating a vector of size $N+1$ (for example with *ones* or *zeros*)

Exercise 4.

Write a script to do the following: On a single figure, plot the following functions:

1. $\sinh(x)$
2. $\cosh(x)$
3. $\tanh(x)$
4. e^x

for $-1 \leq x \leq 1$, with point spacing $\Delta x = 1/10$.

Make \sinh a red line, \cosh a black dotted line, \tanh a blue line with circles at each point, and e^x just green x 's with no line. Make a legend. Label your axes and give the figure a title.

Then, with the same script, create a second figure where you plot the functions in 4 different subplots.

Tip: If you want to open a second window without closing the first one, type *figure(2)* to open a new window for your plot.