

Exercises for Practical #2

In this practical you will work on short MATLAB programs and functions.

1. Modify your code from Practical #1 to write a function which accepts N as an input argument and returns $D2$.
2. Write a code to compute the coefficients of the degree n power series expansion of $\cos(x)$. What is the sum of the first 15 coefficients? (Include the zero coefficients in the sum.)
3. Write an `.m` file that returns the n th Fibonacci number. What is F_{17} ?
4. Using Newton iteration and starting from the initial guess $x_0 = 0$, find a root of $\sin(x) + \cos(x)$. Then look for another root starting from the initial guess $x_0 = 6$.
5. How many primes in $[10 \ 100]$ are ‘mirror primes’ (in the sense that if $m = ab = a*10+b$ is prime then $n = ba = b*10+a$ is also prime)? E.g. $m = 17$ is a ‘mirror prime’ as both 17 and $n = 71$ are prime. (Hint: you might need `floor` and `&.`)
6. Find the sum of all the multiples of 3 or 5 below 1000.
7. What is the smallest positive number that is divisible by all of the numbers from 1 to 10?
8. Implement a bisection algorithm to find the roots of a given function in the interval $[a, b]$.
9. MATLAB has a built-in function called `dec2bin()`, look at its documentation and then write your own function, `myDec2Bin()` which has the same functionality. (Usually it is not a good idea to reinvent the wheel, but this is for practice.)
10. Given a function handle, an interval and a parameter N , write your own routine `trapIntegral` to compute the N -point trapezoidal rule approximation of the integral of the input function. (Hint: Wikipedia Trapezoidal rule.)
Try your code for various periodic and aperiodic functions.