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 nth 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.