

EE317 Computation and Simulation

Assignment 2017-2018

Q1. Newton Fractals:

To run our Newton Fractal code simply open the question one folder in matlab open the files labelled Fractal1 and Fractal2. These should run without any other editing. Fractal 1 uses pre-configured roots, it steps through the complex plane from (-200,-200) to (200,200) and finds which of these roots each point converges towards. It then displays an image colour coded to display which root each point on the plane converges towards.

Fractal 2 does not have the roots pre-configured and has the ability to find the roots itself, this means you can edit the my_func.m and my_func_deriv.m files and include any functions you like however changing these will break the fractal 1 code until its roots are updated. Fractal 2 prints each root it finds in an easily readable format.

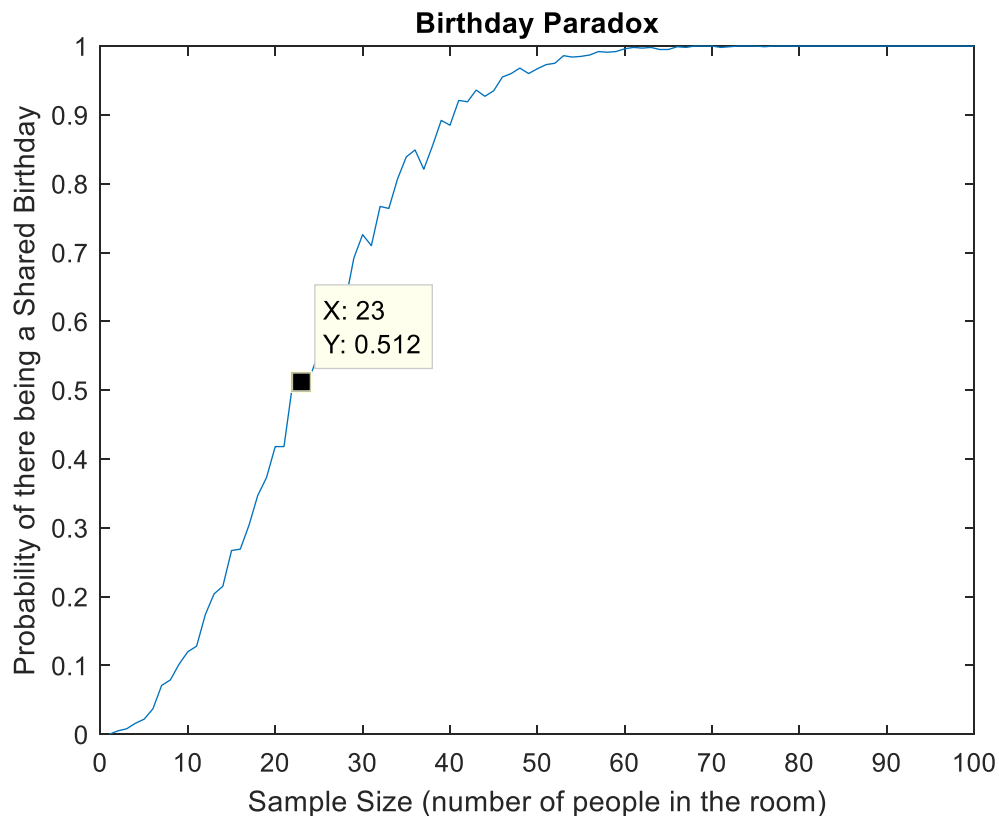
I have included the functions that Fractal1 is configured for by default:

```
result = z^3 - 1;  
result = z^3 + z^2 - 1;  
result = z^4 + 3*z^2 - 3;  
result = z^9 - 3;
```

Q2 Random Numbers

For all the exercises for this part of the assignment all code needed to run each of the codes is all built into each of the m files. There is no additional code or programs needed, so each of the programs can be just ran normally.

1) Birthday Paradox Outcome



The expected outcome of this code was to get 23 people as the group size for the probability of there being a shared birthday. As you can see from the graph below this is exactly the outcome when the probability of there being a shared birthday is greater than 50% when the sample size is 23 people.

2) Random Pi Approximation Outcome

The expected outcome of this code is to get an approximation for pi. From the testing I done my code usually gives pi as 3.14 (+/- 0.01).

3) Random Music Generator Outcome

The outcome of this code was to generate a random piece music. My code does this by assigning a random tone frequency every time it loops, then plays a sound at that frequency then loops and does it again. The expected outcome is a random piece of music about 9 seconds long.

Q3. Integration:

All that needs to be done to ensure that the code for this question works is to make sure you are in the right folder when you go to run the file.

There are no other codes required as the function has been set within the code itself.

The desired output of the code is to provide an estimate for pie (π).

The output of the code is:

Our estimate for pi came to 3.141592652792

Pi is equal to 3.141592653590

Our percentage error is 0.0000000798>>

Q4. Pendulum

Unfortunately, we could not get the code to find the output of the ODE. We apologize for this shortcoming. We have included the code we did write but unfortunately it does not complete the task. It can be ran by opening the question4 folder and running pendulum1. It will print the approximation output and an ODE output that is incorrect.