

MAIN GOAL

#

Create 4 pdf plots of the Collatz sequence

1) length,

2) Maximum value

3) Length occurrences (Histogram)

4) Cumulative average lengths (My own interesting plot)

#####

Clean up Collatz executable

Create total lengths variable

So now we need to actually run and do calculations from all the Collatz sequences

#from 2 to 10,000

Loop from 2 to 10,000 (Counter is N)

{

Setting and counting the number of lines we are reading means that we are

able to figure out the length of the Collatz sequence without having to run it

again

Initialize maximum variable and counter variable, set both to 0

We will now try to only run the Collatz algorithm ONCE per value of N and we

#are going to try to get all the data we need from a single run to increase

#efficiency.

Loop over all values from Collatz algorithm with the input of N

{

Keeping track of number of values looped through as that is the length

Add to our count (To count Length of current sequence)

Way to find maximum by looping through all values

Check if current loop value is higher than stored max,

Set current loop value to the max if it is bigger

}

Now that we have looped through the Collatz sequence of value N,

We have the length of it AND the max value!

```
# Now for graph four, we need to keep track of the total number of lines from ALL  
# Collatz sequences so we need to
```

```
Total_Length = Total_Length + length
```

```
# Now that we have all the calculations done, we actually need to save this  
# as a data point for each of our plots
```

```
# Plot 1: This is the plotted Collatz sequence length  
# Plot 2: This is the plotted Collatz sequence maximum  
# Plot 3: This is a histogram of the occurrences of each Collatz length  
# Plot 4: This is a graph of the average length of the Collatz sequences up to N
```

```
So For:
```

```
Plot 1: Store n and the Length as a data point
```

```
Plot 2: Store n and the Max as a data point
```

```
Plot 3: Store just the Length with no counter as we will want to  
count occurrences later after the main loop is done
```

```
Plot 4: Store the average length cumulative (Total_Lengths / N)
```

```
} # We now no longer want to be inside the loop from 2 to 10,000 as we have collected  
# all the data that we should need
```

```
#Now that we are done putting all of our data points into their respective data files, it  
# is almost time to graph!
```

```
# We need to actually count occurrences first as we haven't actually done that yet
```

```
Read the file of Plot 3 and count the occurrences of each value, store these values  
as our data points
```

```
# Now we actually have all the data we need for each plot
```

```
# so TIME FOR PLOTTING :D (On next page)
```

Plot graph 1 using the data file for it
Plot graph 2 using the data file for it
Plot graph 3 using our data file but make sure its a histogram.
Plot graph 4 using our data file.

#Make sure to save all these outputs as a pdf!

#DONE