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CSE13S
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General Idea:

Collatz Sequence Lengths Graph: Loop from 2 to 10000 by 1 and chart the length of each collatz sequence from 2 to 10000.

Maximum Collatz Sequence Value Graph: Loop from 2 to 10000 by 1 and chart the maximum value of each collatz sequence from 2 to 10000.

Collatz Sequence Length Histogram: Loop from 2 to 10000 by 1 and get the collatz sequence for each number. Graph the frequency of each length from 2 to 10000 in the collatz sequence.

Collatz Sequence Value Histogram: Loop from 2 to 10000 by 1 and get the collatz sequence for each number. Graph the frequency of each value from 2 to 10000 in the collatz sequence.

Pseudocode:

Collatz Sequence Lengths Graph:

```
# Set starting collatz number at 2
# For each collatz number less than 10000
    # Plug the number into the collatz program
    # get the number of values in the collatz sequence
    # transfer the number of values to a data file
    # increment the number by 1
# Set graph output to pdf
# Set x range from [0:10000], y range from [0:300], and set x tics to 1000
# Set x label to n, and y label to length, and title the graph "Collatz Sequence Lengths"
# Graph the collatz sequence lengths with the data file
```

Maximum Collatz Sequence Value Graph:

```
# Set starting collatz number at 2
# For each number less than 10000
    # Plug the number into the collatz program
    # sort the collatz sequence so that the largest value is at the top
    # get only the first value of the collatz sequence which should now be the largest value of
the sequence
    # transfer the maximum value to a data file
    # increment the number by 1
# Set graph output to pdf
# Set x range from [0:10000], y range from [0:100000], and set x tics to 1000
# Set x label to n, and y label to value, and title the graph "Maximum Collatz Sequence Value"
```

Graph the maximum collatz sequence value with the data file

Collatz Sequence Length Histogram:

Set starting collatz number at 2

For each number less than 10000

 # plug the number into the collatz program

 # get the number of lines in the collatz sequence

 # transfer the number of lines to a data file

 # increment the number by 1

numerically sort the data and transfer the sorted numbers into a 2nd data file

get the frequency of each collatz sequence length from the 2nd data file and transfer it into a 3rd data file

Set graph output to pdf

Set x range from [0:225], y range from [0:200], set x tics to 25, and y tics to 20

Set x label to length, and y label to frequency, and title the graph "Collatz Sequence Length Histogram"

Graph the histogram from the 3rd data file

Collatz Sequence Value Histogram:

Set starting collatz number at 2

For each number less than 10000

 # plug the number into the collatz program

 # transfer the collatz sequence to a data file

 # increment the number by 1

numerically sort the data and transfer the sorted numbers into a 2nd data file

get the frequency of each value from the 2nd data file and transfer it into a 3rd data file

Set graph output to pdf

Set x range from [0:100000], y range from [0:5000], set x tics to 10000, and y tics to 1000

Set x label to value, and y label to frequency, and title the graph "Collatz Sequence Value Histogram"

Graph the histogram from the 3rd data file

End of plotting:

Delete any files that need to be reset