

Assignment1 - WRITEUP.pdf

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Abstract

This writeup will include the plots that I produced using my bash script, as well as discussion on which UNIX commands I used to produce each plot and why am I chose to use the them.

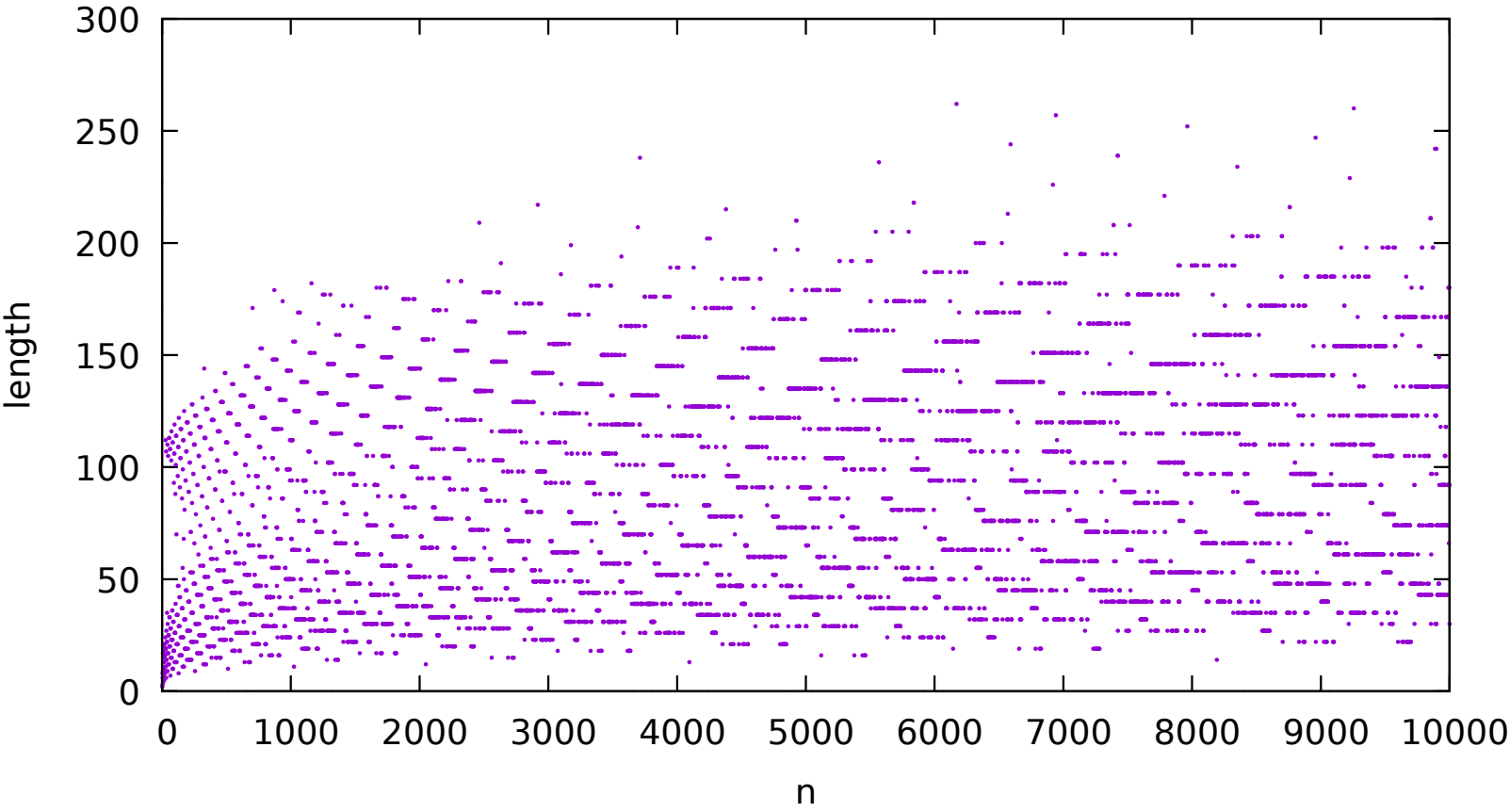
1 Introduction

This assignment is aimed to write a bash script to produce three plots based on the provided files: collatz.c and Makefile in the resources repository.

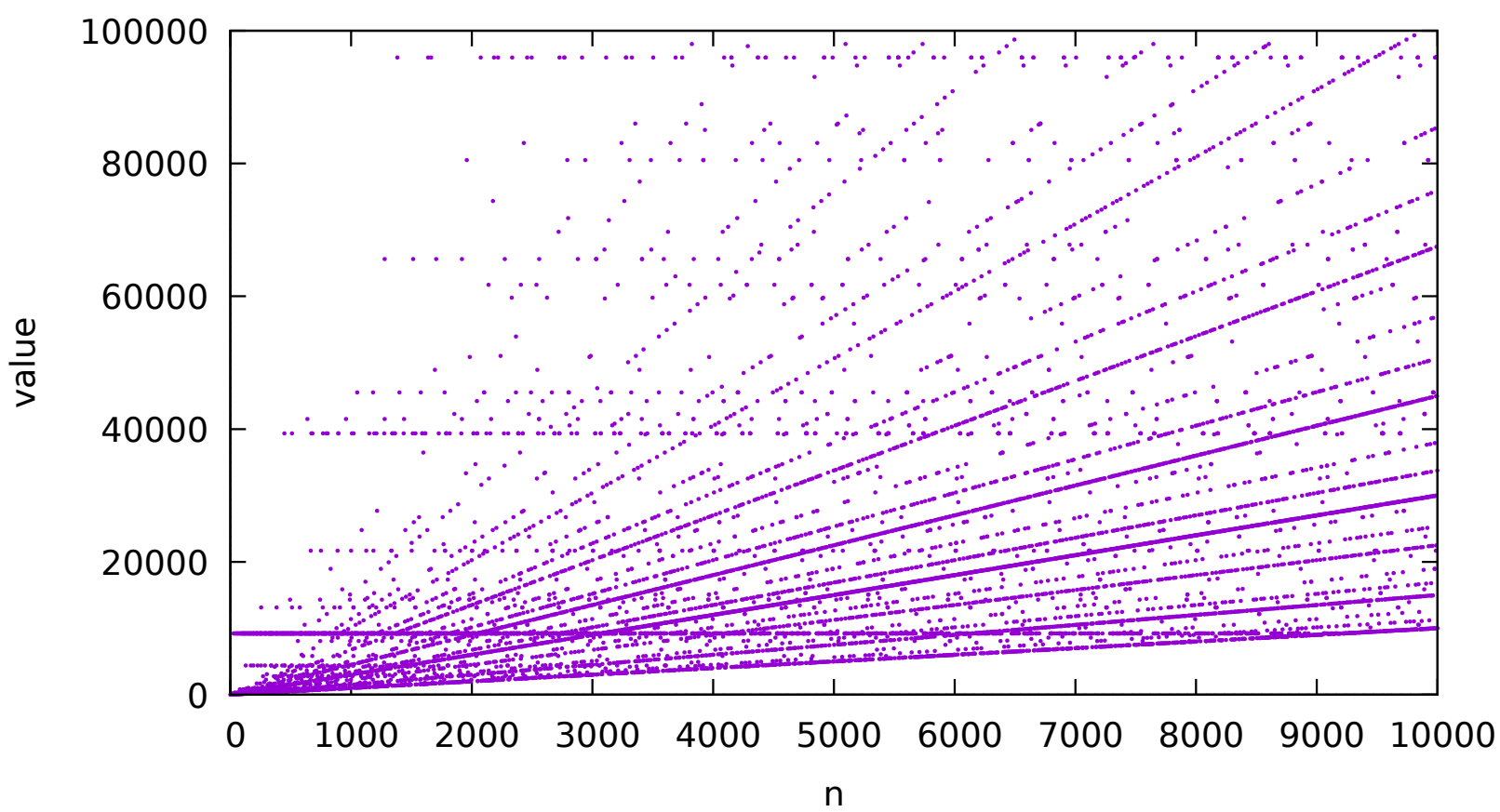
2 Figures

There are the three plots that I produced using my bash script. I use Latex to to insert the PDF of my plots into this WRITUP file.

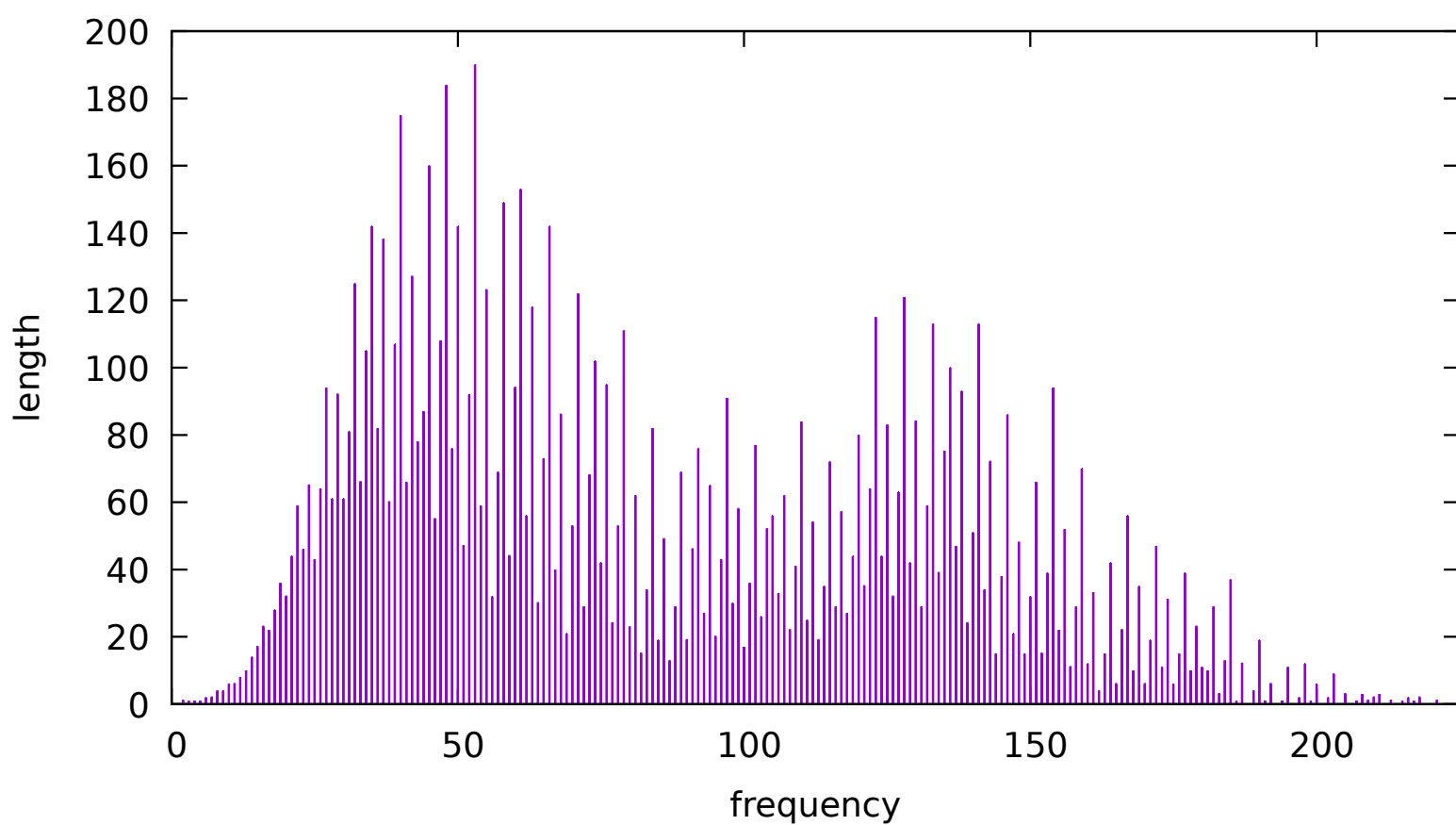
Collatz Sequence Lengths



Maximum Collatz Sequence Value



Collatz Sequence Length Histogram



3 Important UNIX commands I learned

3.1 The important commands I used to make Collatz Sequence Lengths plot

- `wc -l`: This is a command to get the length of the collatz sequence.

When we run the command `./collatz -n [positive integer n]`, for example:

```
./collatz -n 4
```

The output should look like :

```
4
```

```
2
```

```
1
```

So, according to the `asgn1.pdf` file, we should get the length of each sequence from collatz file. So, we use `wc -l` to get the line count of the output of the collatz file. For example, when `n` is 4, the line count of the output should be 3 and the length of the sequence is 3.

- `>>` : This is a command to put the data into a file.

For example, if I want to put the output I got from collatz sequence when `n` is 4 into a file called `length.dat`:

```
./collatz -n 4 >> /tem/length.dat
```

- pipe method: `|`

This method allows for the stdout of one process to be connected, or piped, to the stdin of another process.

for example, if I want to put the output of the length I got from collatz sequence when `n` is 4 into a file called `length.dat`:

```
./collatz -n 4 | wc -l >> /tem/length.dat
```

- `echo -n n`:

`echo -n` will prevent from printing the trailing new line character. I want to use this command because I want to set `n` and `length` which is my x-coordinates and y-coordinates in the same line which allows Gnuplot to recognize these points. like:

```
1 1
```

```
2 2
```

```
3 8
```

```
.....
```

3.2 The important commands I used to make Maximum Collatz Sequence Value plot

- `sort -n` / `sort -nr`:

`sort -n` will sort the data numerically when we want to get the maximum number from a sequence, we should first sort then in the numerically order.

`sort -nr` just like `sort -n` but it will sort the data numerically in reverse.

- `tail -n 1 / head -n 1`: This command will help us pick the number in the last row. After we sort the data, we should then get the tail of the sequence which is the largest number(numerically) in this sequence. `head -n 1` is just like the `tail -n 1` command but it will pick the number in the first row.
- I also use `echo -n n` and `>>` to make Maximum Collatz Sequence Value plot which has been discussed before.

3.3 The important commands I used to make Collatz Sequence Length Histogram

- `uniq -c`:
This command will count for how many repeated elements in the file. Remember to sort before `uniq`. I want to use this command because I want to get the frequency of the length to make Collatz Sequence Length Histogram.
- I also use `>>` and `sort -n` and `wc -l` to make Collatz Sequence Length Histogram which has been discussed before.