CS521 Homework 1

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2.b)

Data from execution of `lists:subtract` is as follows

list_size	time_milisec
1000	6.305
2000	20.561
3000	30.497
4000	34.553
5000	40.282
6000	54.131
7000	72.500
8000	94.614
9000	119.924
10000	147.419
10000	148.033
20000	587.956
30000	1315.765
40000	2341.231
50000	3647.631

and when we divide the `time_milisec` by N^2 we approximately get the constant factor of $2.2 \cdot 10^{-6}$ (precisely, the sampling mean is $2.22 \cdot 10^{-6}$ with sampling standard deviation $1.52 \cdot 10^{-6}$ and with p-value of 95% from `student t-test`) showing the quadratic complexity and the following plot confirms $O(N^2)$ time complexity as well.

Performance measure of lists:subtract function
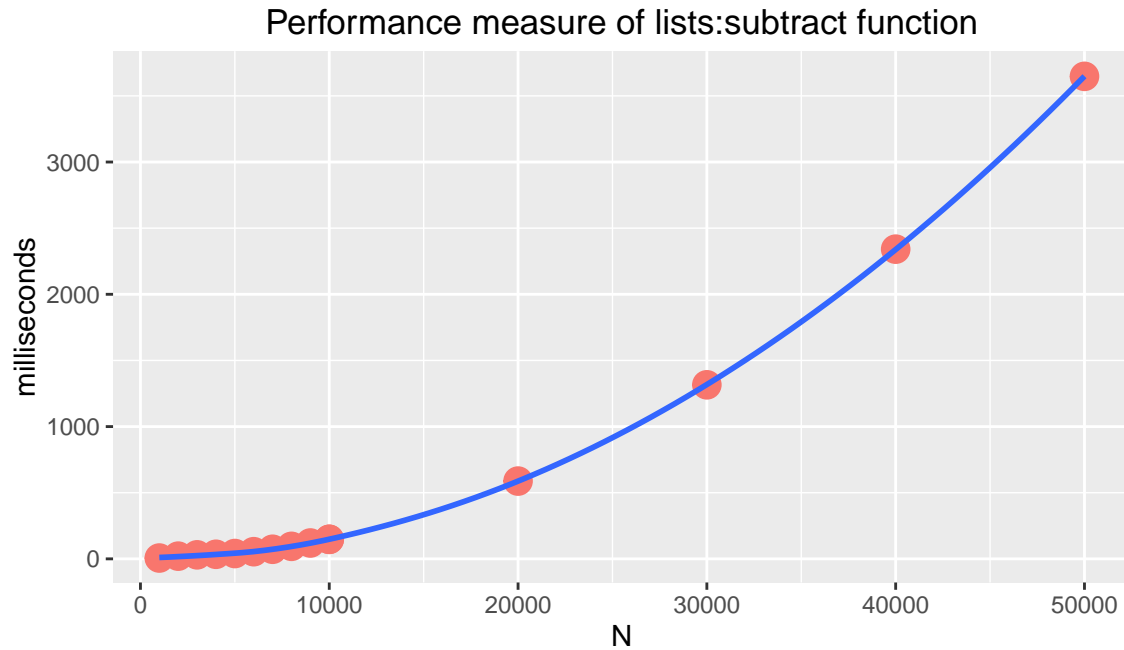
2.d)

Data from execution of the faster `hw1:subtract` function is as follows

list_size	time_milisec
1000	0.112
2000	0.476
3000	0.481
4000	0.787
5000	0.720
6000	0.970
7000	1.331
8000	1.521
9000	1.725
10000	1.794
10000	1.461
20000	3.018
30000	5.563
40000	9.525
50000	10.133

and when we divide the `time_milisec` by $N \log(N)$ we approximately get the constant factor of $2 \cdot 10^{-5}$ (precisely, the sampling mean is $2 \cdot 10^{-5}$ with sampling standard deviation $4 \cdot 10^{-6}$ and with p-value of 98% from `student t-test`) showing $O(N \log(N))$ time complexity and the following plot confirms that as well.

Performance measure of hw1:subtract function