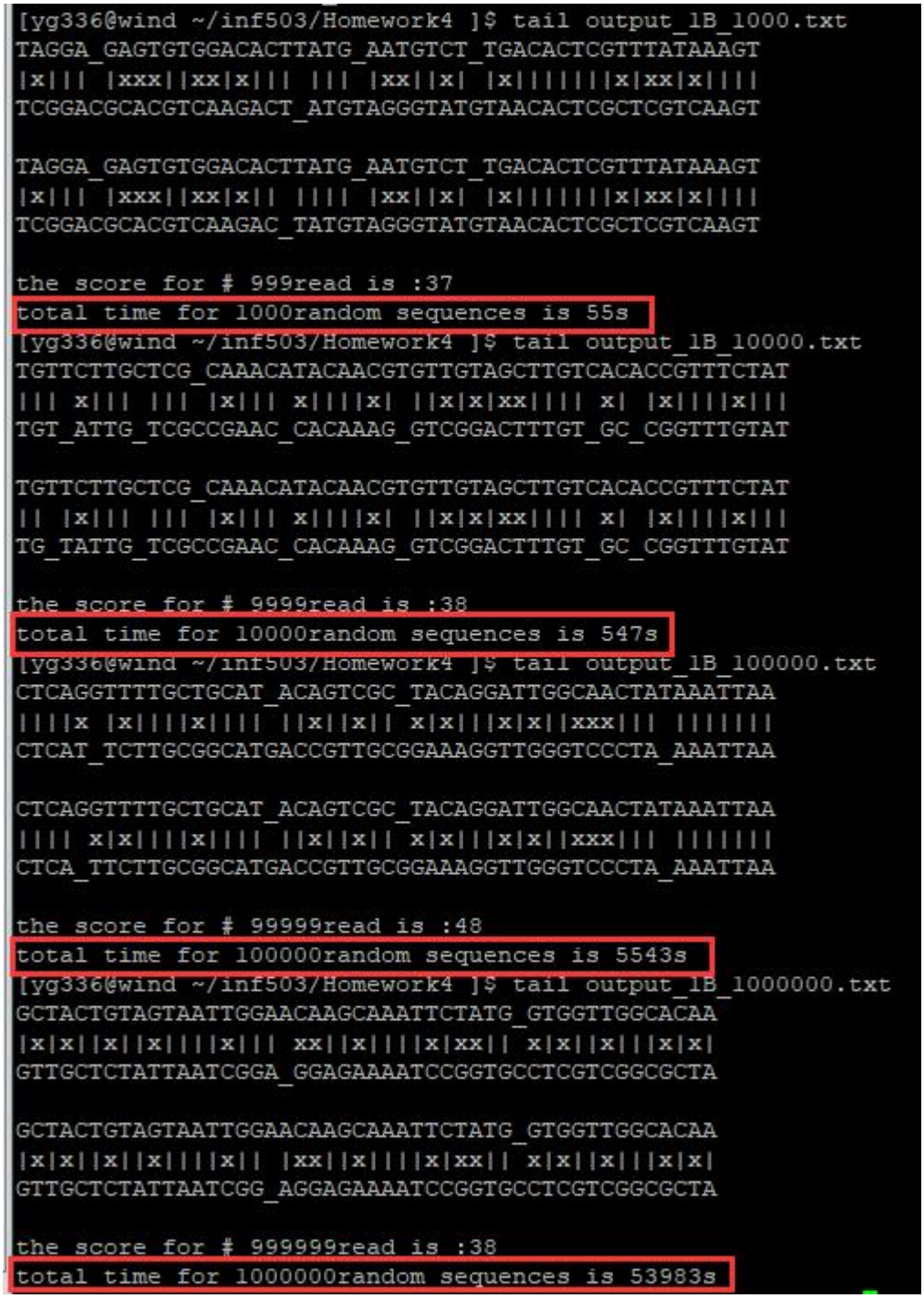
Problem 1A

Since there are a lot of results for the total 15 readsets, I just paste some of them here:

```
the score for # 6read is :97
******************************results for # 7 read:**********************************
GGACACTTCGCATGGTGGACAGCCTTTGTTACTAATGTGAATGCGTCATC
|||||||||||||||||||||||||||||||||||||||||||||||||||
GGACACTTCGCATGGTGGACAGCCTTTGTTACTAATGTGAATGCGTCATC

the score for # 7read is :100
******************************results for # 8 read:**********************************
GATGTAATTATCTTGGCAAACCACGCGAACAAATAGATGGTTATGTCATG
||||||||||||||||||x||||||||||||||x||||||||||x|||
GATGTAATTATCTTGGCTAACCACGCGAACAAATTGATGGTTATGTTATG

the score for # 8read is :91
******************************results for # 9 read:**********************************
GAGGAATACAAATCCAATTCAGTTGTCTTCCTATTCTTTATTTGACATGA
|||||||||x||||||||||x||||||x|||||||||||x||||||||||
GAGGAATACCAATCCAATTCACTTGTCTCCCTATTCTTTCTTTGACATGA

the score for # 9read is :88
******************************results for # 10 read:*********************************
AGGGGTACTGCTGTTATGTCTTTAAAAGAAGGTCAAATCAATGATATGAT
|||||||||||||||||||||||||   |||||||||||||||||||||||
AGGGGTACTGCTGTTATGTCTTTA___GAAGGTCAAATCAATGATATGAT

AGGGGTACTGCTGTTATGTCTTTAAAAGAAGGTCAAATCAATGATATGAT
|||||||||||||||||||||||| |  |||||||||||||||||||||||
AGGGGTACTGCTGTTATGTCTTT_A__GAAGGTCAAATCAATGATATGAT

AGGGGTACTGCTGTTATGTCTTTAAAAGAAGGTCAAATCAATGATATGAT
|||||||||||||||||||||||  | |||||||||||||||||||||||
AGGGGTACTGCTGTTATGTCTTT__A_GAAGGTCAAATCAATGATATGAT

AGGGGTACTGCTGTTATGTCTTTAAAAGAAGGTCAAATCAATGATATGAT
|||||||||||||||||||||||   |||||||||||||||||||||||
AGGGGTACTGCTGTTATGTCTTT___AGAAGGTCAAATCAATGATATGAT

the score for # 10read is :85
******************************results for # 11 read:*********************************
GTAGACTTATAATTAGAGAAAACAACAGAGTTGTTATTTCTAGTGATGTT
|||||||||||||||||||||||||||||||||||||||||||||||||||
GTAGACTTATAATTAGAGAAAACAACAGAGTTGTTATTTCTAGTGATGTT

the score for # 11read is :100
******************************results for # 12 read:*********************************
CAATGTTTGTTTTTCTTG__TTTTATTGCCACTAGTCTCTAGTCAGTGTG
||||||||||||||||||  |||||||||||||||||||||||||||||
CAATGTTTGTTTTTCTTGCCTTTTATTGCCACTAGTCTCTAGTCAGTGTG

the score for # 12read is :90
******************************results for # 13 read:*********************************
ATTACCCCCTGCATACACTA___ATTCTTTCACACGTGGTGTTTATTACC
||||||||||||||||||||   |||||||||||||||||||||||||||
ATTACCCCCTGCATACACTAGGGATTCTTTCACACGTGGTGTTTATTACC

the score for # 13read is :85
******************************results for # 14 read:*********************************
GTTTTACATTCAACTCAGGACTTGTTCTTACCTTTCTTTTCCAATGTTAC
|||||||||||||||||||||||||||||||||||||||||||||||||||
GTTTTACATTCAACTCAGGACTTGTTCTTACCTTTCTTTTCCAATGTTAC

the score for # 14read is :100
```

All the results can be found in the txt file "output_1A.txt".

Problem 1B



Problem 2A

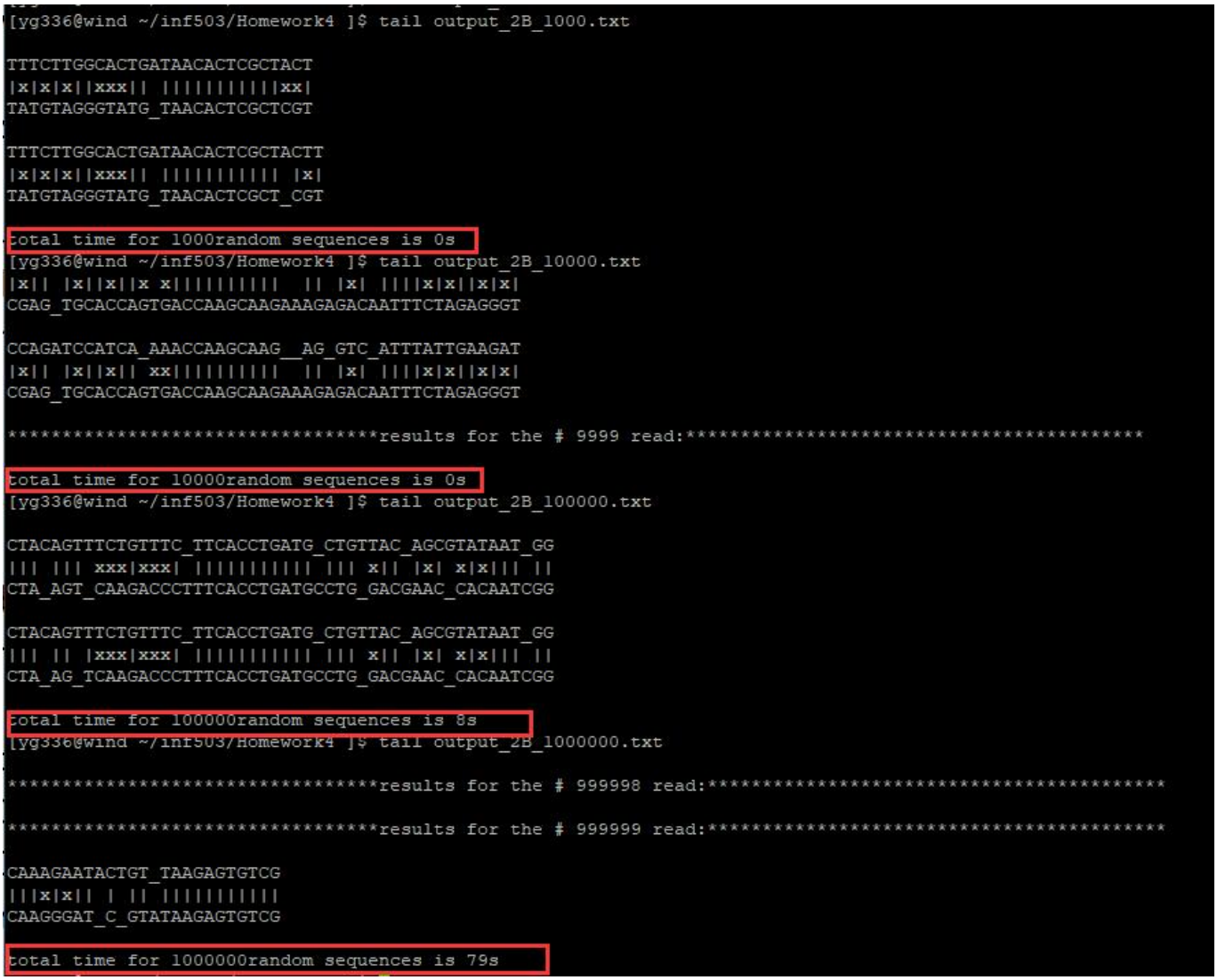
Since there are a lot of results for the total 15 readsets, I just paste some of them here:

```
**********************************results for the # 2 read:****************************************

**********************************results for the # 3 read:****************************************

ATGCGTTAGCTTACTACAACACAACAAAGGGAGGTAGGT
|x|| |x|||x||  ||||||||||xx|x|xx|x|x|
AGGC_TAAGCTAAC__CAACACAACAACAGAATCTCGCT

CTAACTTTAGAGTC_CAACCAACAGAATCT
||||xx|x|xxxx| |||| ||||||||||
CTAAGCTAACCAACACAAC_AACAGAATCT

CTAACTTTAG_AGTCCAACCAACAGAATCT
||||xx|x|x |xxx|||| ||||||||||
CTAAGCTAACCAACACAAC_AACAGAATCT

CTAACTTTA_GAGTCCAACCAACAGAATCT
||||xx|x| x|xxx|||| ||||||||||
CTAAGCTAACCAACACAAC_AACAGAATCT

CTAA_CTTTAGAGTCCAACCAACAGAATCT
||||  ||xxxx|xxx|||| ||||||||||
CTAAGCTAACCAACACAAC_AACAGAATCT

CTAACTTTAGAGTC_CAACCAACAGAATCT
||||xx|x|xxxx| ||| ||||||||||
CTAAGCTAACCAACACAA_CAACAGAATCT

CTAACTTTAG_AGTCCAACCAACAGAATCT
||||xx|x|x |xxx||| ||||||||||
CTAAGCTAACCAACACAA_CAACAGAATCT

CTAACTTTA_GAGTCCAACCAACAGAATCT
||||xx|x| x|xxx||| ||||||||||
CTAAGCTAACCAACACAA_CAACAGAATCT

CTAA_CTTTAGAGTCCAACCAACAGAATCT
||||  ||xxxx|xxx||| ||||||||||
CTAAGCTAACCAACACAA_CAACAGAATCT

**********************************results for the # 4 read:****************************************

AACATGGCAAGGAAGACCTTAAAT
|||||||||||||| |x|x ||||
AACATGGCAAGGAA_ATCA_AAAT

AACATGGCAAGGAAGACCTTAAAT
|||||||||||||| |x| x||||
AACATGGCAAGGAA_ATC_AAAAT
```

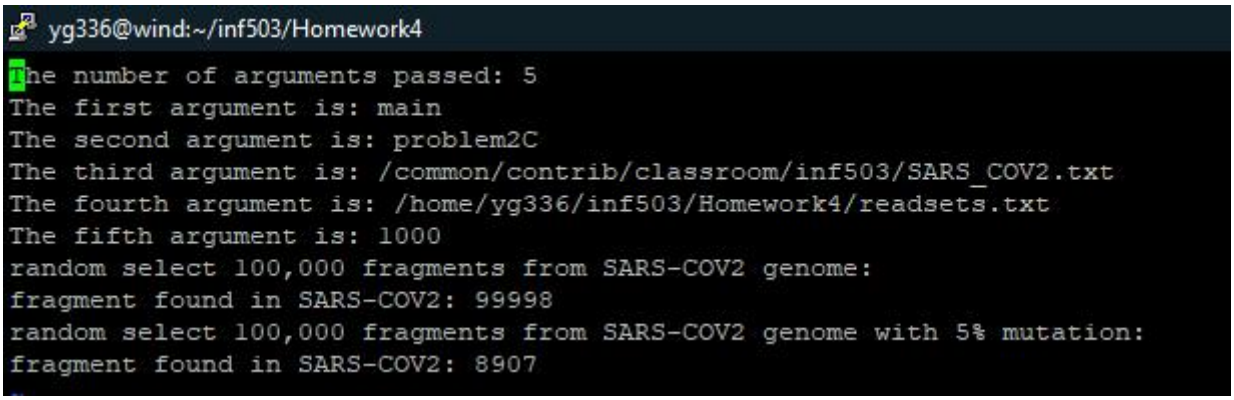
All the results can be found in the txt file "output_2A.txt".

Problem 2B

The BLAST method is faster than Smith-Waterman algorithm.



Problem 2C



Note: All the fragments should be found in the SARS-COV2 genome if they are randomly selected with no mutation. The mismatch here is because of the boundary condition.