

HW 1

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1 Question 5

For the following mRNA sequence, can you extract its 5' UTR, 3' UTR and the protein sequence?

ACTTGTCATGGTAACTCCGTCGTACCAGTAGGTCATG

ATG is the start codon. **TAA**, **TAG**, **TGA** are the stop codons. Notice the start codon:

ACTTGTC**ATG**GTAACTCCGTCGTACCAGTAGGTCATG

Notice the stop codon **TAG**:

ACTTGTCATGGTAACTCCGTCGTACCAG**TAG**GTCATG

We now have the 5' untranslated region occurring before the start codon, the protein sequence occurring between and including the start and stop codons, and the 3' untranslated region occurring after the stop codon.

The 5' Untranslated Region:

ACTTGTC

The coding region:

ATGGTAACTCCGTCGTACCAGTAG

The 3' Untranslated Region:

GTCATG

2 Z-algorithm Results

Here is the Z-Algorithm result for a random string S.

S=ABSBAJSLABSKDFBAABASBABSBAJSLABKABSBAK
Results from the algorithm are:

- Counter = 0, Z = 0
- Counter = 1, Z = 0
- Counter = 2, Z = 0
- Counter = 3, Z = 1
- Counter = 4, Z = 0
- Counter = 5, Z = 0
- Counter = 6, Z = 0
- Counter = 7, Z = 0
- Counter = 8, Z = 0
- Counter = 9, Z = 2
- Counter = 10, Z = 0
- Counter = 11, Z = 0
- Counter = 12, Z = 0
- Counter = 13, Z = 0
- Counter = 14, Z = 1
- Counter = 15, Z = 0
- Counter = 16, Z = 0
- Counter = 17, Z = 1
- Counter = 18, Z = 0
- Counter = 19, Z = 0
- Counter = 20, Z = 1
- Counter = 21, Z = 0
- Counter = 22, Z = 9
- Counter = 23, Z = 0
- Counter = 24, Z = 0
- Counter = 25, Z = 1

- Counter = 26, Z = 0
- Counter = 27, Z = 0
- Counter = 28, Z = 0
- Counter = 29, Z = 0
- Counter = 30, Z = 0
- Counter = 31, Z = 0
- Counter = 32, Z = 0
- Counter = 33, Z = 4
- Counter = 34, Z = 0
- Counter = 35, Z = 0
- Counter = 36, Z = 1
- Counter = 37, Z = 0

We also coded up the Exact pattern matching implementation. It's Results are located here:

String S= TEST\$ASTEALGHSLTE TESTEST

- Counter = 0, Z = 0
- Counter = 1, Z = 0
- Counter = 2, Z = 0
- Counter = 3, Z = 1
- Counter = 4, Z = 0
- Counter = 5, Z = 0
- Counter = 6, Z = 0
- Counter = 7, Z = 2
- Counter = 8, Z = 0
- Counter = 9, Z = 0
- Counter = 10, Z = 0
- Counter = 11, Z = 0
- Counter = 12, Z = 0

- Counter = 13, Z = 0
- Counter = 14, Z = 0
- Counter = 15, Z = 2
- Counter = 16, Z = 0
- Counter = 17, Z = 0
- Counter = 18, Z = 4
- Counter = 19, Z = 0
- Counter = 20, Z = 0
- Counter = 21, Z = 4
- Counter = 22, Z = 0
- Counter = 23, Z = 0
- Counter = 24, Z = 0

The program is additionally able to read in and parse FASTA files. Here is the example output from the program doing so.

- Pattern String: AGTCA
- Test String to search: ATCGAATTTCGGTGCAAGTCAGTCAGAACAGTAGC-CGATGCACAGGGATACAAGTACCGAGCAGAAAACGGGTTAGCGATGCGCGATAGCAGATC
- File read in : ./TestFASTA.fasta
- The Z-value for index position 1 is 0
- The Z-value for index position 2 is 0
- The Z-value for index position 3 is 0
- The Z-value for index position 4 is 1
- The Z-value for index position 5 is 0
- The Z-value for index position 6 is 1
- The Z-value for index position 7 is 0
- The Z-value for index position 8 is 0
- The Z-value for index position 9 is 0
- The Z-value for index position 10 is 1
- The Z-value for index position 11 is 1

- The Z-value for index position 12 is 0
- The Z-value for index position 13 is 0
- The Z-value for index position 14 is 0
- The Z-value for index position 15 is 0
- The Z-value for index position 16 is 0
- The Z-value for index position 17 is 0
- The Z-value for index position 18 is 0
- The Z-value for index position 19 is 0
- The Z-value for index position 20 is 1
- The Z-value for index position 21 is 5
- The Z-value for index position 22 is 0
- The Z-value for index position 23 is 0
- The Z-value for index position 24 is 0
- The Z-value for index position 25 is 5
- The Z-value for index position 26 is 0
- The Z-value for index position 27 is 0
- The Z-value for index position 28 is 0
- The Z-value for index position 29 is 1
- The Z-value for index position 30 is 0
- The Z-value for index position 31 is 1
- The Z-value for index position 32 is 1
- The Z-value for index position 33 is 0
- The Z-value for index position 34 is 3
- The Z-value for index position 35 is 0
- The Z-value for index position 36 is 0
- The Z-value for index position 37 is 2
- The Z-value for index position 38 is 0
- The Z-value for index position 39 is 0

- The Z-value for index position 40 is 0
- The Z-value for index position 41 is 0
- The Z-value for index position 42 is 1
- The Z-value for index position 43 is 0
- The Z-value for index position 44 is 0
- The Z-value for index position 45 is 0
- The Z-value for index position 46 is 1
- The Z-value for index position 47 is 0
- The Z-value for index position 48 is 2
- The Z-value for index position 49 is 0
- The Z-value for index position 50 is 0
- The Z-value for index position 51 is 0
- The Z-value for index position 52 is 1
- The Z-value for index position 53 is 0
- The Z-value for index position 54 is 1
- The Z-value for index position 55 is 0
- The Z-value for index position 56 is 1
- The Z-value for index position 57 is 3
- The Z-value for index position 58 is 0
- The Z-value for index position 59 is 0
- The Z-value for index position 60 is 1
- The Z-value for index position 61 is 0
- The Z-value for index position 62 is 0
- The Z-value for index position 63 is 0
- The Z-value for index position 64 is 2
- The Z-value for index position 65 is 0
- The Z-value for index position 66 is 0
- The Z-value for index position 67 is 2

- The Z-value for index position 68 is 0
- The Z-value for index position 69 is 1
- The Z-value for index position 70 is 1
- The Z-value for index position 71 is 1
- The Z-value for index position 72 is 1
- The Z-value for index position 73 is 0
- The Z-value for index position 74 is 0
- The Z-value for index position 75 is 0
- The Z-value for index position 76 is 0
- The Z-value for index position 77 is 0
- The Z-value for index position 78 is 0
- The Z-value for index position 79 is 2
- The Z-value for index position 80 is 0
- The Z-value for index position 81 is 0
- The Z-value for index position 82 is 0
- The Z-value for index position 83 is 1
- The Z-value for index position 84 is 0
- The Z-value for index position 85 is 0
- The Z-value for index position 86 is 0
- The Z-value for index position 87 is 0
- The Z-value for index position 88 is 0
- The Z-value for index position 89 is 0
- The Z-value for index position 90 is 1
- The Z-value for index position 91 is 0
- The Z-value for index position 92 is 2
- The Z-value for index position 93 is 0
- The Z-value for index position 94 is 0
- The Z-value for index position 95 is 2

- The Z-value for index position 96 is 0
- The Z-value for index position 97 is 1
- The Z-value for index position 98 is 0
- The Z-value for index position 99 is 0
- The Z-value for index position 100 is 0
- The Z-value for index position 101 is 2
- The Z-value for index position 102 is 0
- The Z-value for index position 103 is 0
- The Z-value for index position 104 is 0
- The Z-value for index position 105 is 2
- The Z-value for index position 106 is 0
- The Z-value for index position 107 is 0
- The Z-value for index position 108 is 0
- The Z-value for index position 109 is 2
- The Z-value for index position 110 is 0
- The Z-value for index position 111 is 0
- The Z-value for index position 112 is 2
- The Z-value for index position 113 is 0
- The Z-value for index position 114 is 0
- The Z-value for index position 115 is 1
- The Z-value for index position 116 is 1
- The Z-value for index position 117 is 1
- The Z-value for index position 118 is 0
- The Z-value for index position 119 is 0
- The Z-value for index position 120 is 0
- The Z-value for index position 121 is 0
- The Z-value for index position 122 is 2
- The Z-value for index position 123 is 0

- The Z-value for index position 124 is 0
- The Z-value for index position 125 is 0
- The Z-value for index position 126 is 0
- The Z-value for index position 127 is 0
- The Z-value for index position 128 is 0
- The Z-value for index position 129 is 1
- The Z-value for index position 130 is 1
- The Z-value for index position 131 is 0
- The Z-value for index position 132 is 0
- The Z-value for index position 133 is 1
- The Z-value for index position 134 is 0
- The Z-value for index position 135 is 0
- The Z-value for index position 136 is 0
- The Z-value for index position 137 is 2
- The Z-value for index position 138 is 0
- The Z-value for index position 139 is 0
- The Z-value for index position 140 is 0
- The Z-value for index position 141 is 2
- The Z-value for index position 142 is 0
- The Z-value for index position 143 is 0
- The Z-value for index position 144 is 1
- The Z-value for index position 145 is 0
- The Z-value for index position 146 is 0
- The Z-value for index position 147 is 0
- The Z-value for index position 148 is 1
- The Z-value for index position 149 is 0
- The Z-value for index position 150 is 1
- The Z-value for index position 151 is 2

- The Z-value for index position 152 is 0
- The Z-value for index position 153 is 0
- The Z-value for index position 154 is 1
- The Z-value for index position 155 is 0
- The Z-value for index position 156 is 1