Assignment 1.
Due: February 5, in class

Question 1 – 60% Question 2 – 40% Question 3 – 20% bonus
For graduate students: Question 1 – 50% Question 2 – 30% Question 3 – 20%

1. Biological

Present a linear-time algorithm[1] for finding the longest *palindrome*[2] in a given string.

Input example: *eveseveneveseven*

Modify your algorithm to find the longest *complemented palindrome*[3] in a given DNA sequence.
Input example: *ACAGACATATGTCTCTT*

2. Non-biological

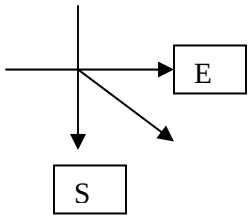
Solve the following puzzle:
You need to go from point A1 to point E8, moving through the cells of the table: only East, South and South-East direction is allowed.

While passing through a cell of the table, you collect the specified number of gold coins.

Find the path that will end up with the maximum number of coins collected.

In your answer, specify the number of collected coins and the path you used to collect them.

You are allowed to use an automated tool presented in class.



	1	2	3	4	5	6	7	8
A	1	3	4	5	3	1	5	4
B	4	5	3	1	5	4	6	3
C	3	1	5	4	6	3	3	5
D	1	3	4	5	3	4	5	4
E	1	3	1	3	4	5	5	4
F	1	3	4	5	3	1	1	3
G	1	3	4	5	5	4	4	5
E	4	5	3	1	4	5	3	1

3. For graduate students

Variant A.

Use the existence of a linear-time exact matching algorithm to solve the following problem in linear time[1]. Given 2 strings, A and B, determine if A is a cyclic rotation of B, that is if A and B have the same length and A consists of a suffix of B followed by a prefix of B. For example, *defabc* is a cyclic rotation of *abcdef*.

---

[1]The algorithm can be presented in any of 2 forms:

- detailed description (intuition) plus pseudocode, or
- detailed description (intuition) plus a step-by-step example on a meaningful input

[2] A *palindrome* is a string that reads the same backwards and forwards. For example, *kayak*, *reviver*, *racecar*.

[3] A *complemented palindrome* is a DNA sequence that becomes a palindrome if each character in one half of a sequence is changed to its complement character (In DNA, A-T are complements and C-G are complements). For example string CCTTAATTAAGG, if we change TTAAGG to its complementary strand, AATTCC, becomes a palindrome.