

Math 495R Homework 9

- (1) Write a function that takes a string of capital letters and a positive integer K , and returns the number of times the characters in the string at positions n and $n + K$ are the same (the number of **coincidences** at distance K).

Write a function that takes a string of capital letters and returns the distance $K \leq 20$ with the most coincidences.

Recall that if S is a python string, the syntax to select the character at position n is $S[n]$ (the same as for an array).

- (2) Write a function that takes an array A and returns the j -th shift of the array, which is the array A_j whose ℓ -th entry is the same as the $(\ell - j)$ -th entry of A (wrapping around for negative indexes). For instance, if

$$A = [.082, .015, .028, \dots, .020, .001]$$

is an array of length 26, then

$$A_2 = [.028, \dots, .020, .001, .082, .015] \text{ and } A_{25} = [.001, .082, .015, .028, \dots, .020].$$

- (3) Let A be the array with values given in the table below. For $0 \leq j \leq 25$, let A_j be the j -th shift of A as described in the previous problem.

Write a function that takes an array W of length 26 and returns the value j which gives the maximum value of the dot-product $W \cdot A_j$.

a	b	c	d	e	f	g	h	i	j
.082	.015	.028	.043	.127	.022	.020	.061	.070	.002
k	l	m	n	o	p	q	r	s	t
.008	.040	.024	.067	.075	.019	.001	.060	.063	.091
u	v	w	x	y	z				
.028	.010	.023	.001	.020	.001				