

Write your **lastname, firstname, group and B** on the top-right side of each sheet of paper. Leave a 2cm margin for stapling (on the left for the front side, on the right for the back side of paper).

Closed book. Time: 08:35-10:25

Problem 1 (3p): Phrase counter

Write a program that reads a text from **stdin**, then computes and outputs to **stderr** the number of sentences/phrases (separated by punctuation marks, i.e. '.', '?', ';', and '!') and the number of words in each sentence. Assume that the only possible word separator is space.

Problem 2 (3p): Subarray

Write a program that reads from a text file named **array.txt** a vector of at most 1523 integers, and finds the index and the length of the *longest sub-array* that is sorted ascending. The program should output to **stdout** the two numbers, separated by one space.

Problem 3 (3p): ColMax elements

In a matrix, a **colMax** element has the property of being the maximum on its row and the minimum on its column, or vice versa. Write a function which receives a matrix as an argument, and prints to **stdout** the positions and the values of the **colMax** elements.

Write your **lastname, firstname, group and B** on the top-right side of each sheet of paper. Leave a 2cm margin for stapling (on the left for the front side, on the right for the back side of paper).

Closed book. Time: 08:00-08:35

1. (1p) Explain the difference between

`const int *p;` and `int * const p;`

2. (1p) Determine the output of the following code:

```
int v( ) {
    int m=0;
    return m--;
}
int main( ) {
    printf ( "%d\n" , v( ) ) ;
    return 1;
}
```

3. (1p) Explain what will happen when the following code is run?

```
int y;
while(y < 45) {
    printf ( "%i " , y) ;
    y--;}

```

4. (2p) What does the following code do?

```
void af( int *y) {
    y = malloc(sizeof ( int ) ) ;
    *y = 92;
}
int main( ) {
    int t = 11;
    af( &t ) ;
    printf ( "%d\n" , t) ;
    return 1;
}
```

5. (1p) Given the declaration:

`typedef struct{float x; float y} COMPLEX;` and the function heading
`void dif(COMPLEX a, COMPLEX *b, COMPLEX &c)`

Write the expression which calculates the real part of the variable **c**, the difference of complex numbers **a** and **b**.

6. (3p) Write a function that mirrors a square matrix of floats around the second diagonal, in place, using the least amount of extra memory (not another empty matrix).
