C

On the **front of each page, top-right corner**, write your **family name, firstname(s), group number and letter code** – the latter in a circle

P1 [40%]

The program you have to develop program should read from the file named `data.txt` a sequence of natural numbers. Then it should print to the standard output all the numbers that do not divide through a number of neighbors to the left and right of their position in the sequence.

The **input data** is as follows:
- first line: number of elements in the sequence, n, number of left neighbors, l, and number of right neighbors, r, separated by single spaces
- next line: numbers in the sequence, separated by single spaces

Sample input	Output for sample input
`20 4 5` `11 7 2 22 13 26 12 2 4 6 8 9 3 7 5 25 15 18 19 30`	`11 7 2 13 2 3 7 5 18 19`

P2[60%]

You have a number of bottles, and a number of glasses. Every bottle, as well as every glass, is symbolized by two letters and a number. The first letter is 'B' for bottle or 'G' for glass. The number, always an integer, represents the capacity in milliliters for bottles, or the amount of liquid it contains – for glasses. You have to fill as few bottles as possible using the liquid found in glasses.
Data is given as:
   - number of bottles
   - bottle descriptions
   - number of glasses
   - description of glasses
You should print the status of the used bottles, i.e. capacity and how much liquid.

Sample input	Output for sample input

6
B 700
B 1000
B 500
B 500
B 330
B 1500
10
G 200
G 200
G 500
G 250
G 100
G 400
G 400
G 300
G 130
G 500
	`Bottle cap=1500 fill=1500`
	`Bottle cap=1000 fill=1000`
	`Bottle cap=700 fill=480`

C

(30 minutes work time)

On the **front of each page, top-right corner**, write your **family name, firstname(s), group number and letter code** – the latter in a circle

1. (2p) Write in C a function which prints the diagonal elements of a dynamically allocated matrix of floats using only pointers. All needed input data is passed as arguments.

2. (1p) What is the output of the function `f` below when invoked as `f('d');`

```
void f (char ch)
{
      if (ch >= 'a ' && ch <= 'h' )
      {
           putchar( ch ) ;
           f( ch + 1 ) ;
      }
      else putchar( ' \n' ) ;
}
```

---

3. (4p) Trace the code to find the output of the following C program.

```
#include <stdio.h>

void f(int q);

int e = 1, m = 2, n = 3, q = 4;

int main(){
  int e = 5, n = 6;
  f(e);
  f(m);
  f(n);
  printf("%d %d %d %d\n",e,m,n,q);
  return 0;
}

void f(int q){
  static int e = 0;
  e = e + 7;
  m = e + q;
  n++;
  q--;
  printf("%d %d %d %d\n",e,m,n,q);
}
```

---

4. (1p) There is a file of length 1024 bytes, named "test.dat", located in the current directory.
After executing the sequence:

```
int df;
char buf[256];
df=open("test.dat", O_RDWR);
read(df, &buf, 207);
lseek(df, 3L, SEEK_SET);
```

what will be the value of the file position indicator?

---

5. (1p) How can structures be passed to functions in C and in C++?