Programming and Data Structures
Semester 2
L1-Maths

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TP5   Pointers

Ex 5.1   Display

What do the following two programs display? (Show Execution History)

```c
#include <stdio.h>
#include <stdlib.h>
int main ( void )
{
 int x=1, y =2;
 int *a = &x, *b = &y, *c = a;
 printf ("*a = %d, *b = %d, *c = %d\n", *a, *b, *c);
 a = b;
 printf ("*a = %d, *b = %d, *c = %d\n", *a, *b, *c);
 *a = 3;
 printf ("*a = %d, *b = %d, *c = %d\n", *a, *b, *c);
 *c = 4;
 printf ("x = %d, y = %d\n", x, y);
 *b = *c;
 if(b == c)
   *a = 5;
 else
   *a = 6;
 printf ("*a = %d\n", *a);
 return 0;
 }
```

```c
#include <stdio.h>
#include <stdlib.h>
 int fct ( int *a, int b)
  {   a = &b;
     b=*a;
     return *a*b;
  }
 void main ()
{  int i=2, j, k=3, l, m=5, n=0;
   int *p=&k, *q=&l, *r=&j;
   j = i*2;
   printf ("i=%d, j=%d\n", i, j);
   *q = *p;
   printf ("p=%d, q=%d\n", *p, *q);
   p = q;  l = 4;
   printf ("p=%d, q=%d\n", *p, *q);
   *p = (*p) +(*q);
   printf ("*k=%d, *l=%d\n", k, l);
   fct (&m, n);
   printf ("*m=%d, *n=%d\n", m, n);
   printf ("*r**r : %d\n", *r**r);
   printf ("r : %d\n" ,(*r+r)-r+*r);
 }
```

Ex 5.2   Successive subtractions

Write a program that uses successive subtractions to calculate the integer quotient and the remainder of the integer division of two integers entered by the user.

For example, $\dfrac{23}{5}$ is calculated as follows:

23 - 5 = 18 ------> 1st subtraction
18 - 5 = 13 ------> 2nd subtraction
13 - 5 = 8   ------> 3rd subtraction
8 - 5 = 3   ------> 4th subtraction
So the quotient is 4 and the remainder of the division is 3.

In this program, the function **IntegerDivision** uses successive subtractions to calculate the quotient and remainder of the integer division. In the main function, the user is asked to enter the dividend and divisor. The program also checks whether the divisor is not zero before performing the division, to avoid dividing by zero. The results are then displayed.