Week 5: Structured data and pointers

Exercise 1 - Area of rectangle

A function, “area”, calculates and returns the area of a rectangle as an integer. The input rectangle is given as four integer coordinates, x1, x2, y1, and y2. Complete the function signature below

```
_______  _________ ( ____________________________________ ) {

  return (x2 - x1) * (y2 - y1);
}
```

Since the function has to return the area as an integer, the signature should be the following:

```
int area(int x1, int x2, int x3, int x4) {
```

Exercise 2 - Increment function

The function, “increment”, takes a pointer to an integer and adds 1 to the integer value to which it prints. The function does not return any value. Complete the function signature and function body below, so that the main function prints 6 when executed.

```
_________  ____________________ ( _______________ ) {


  ____________________;
}

int main () {
  int v = 5;
  increment(&v);
  printf("%d", v);
  return 0;
}
```

We use a pointer in this case to make sure that the function holds onto the value so that the function prints the correct value:

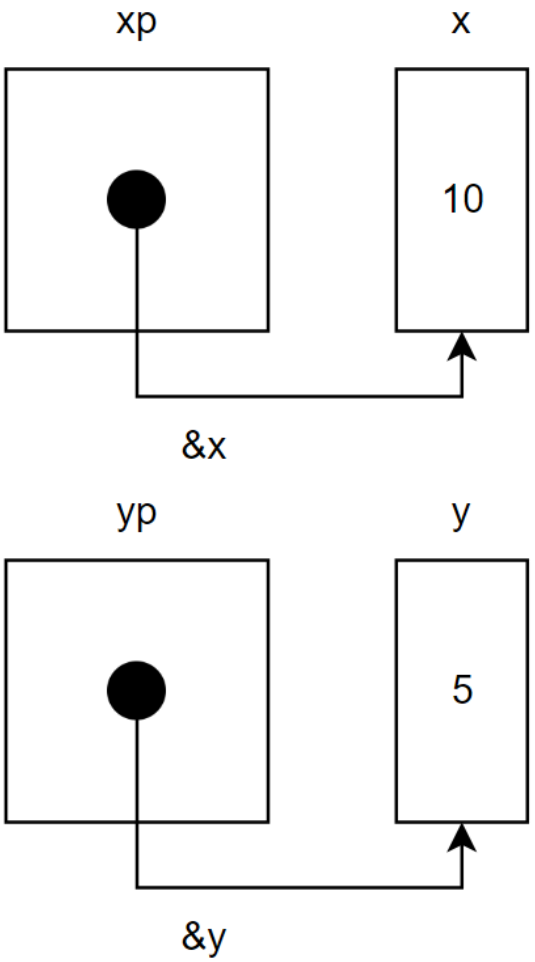
```
void increment(int *v) {*v=*v+1;}
```

Exercise 3 - Function 1

The program for this exercise itself is quite simple, and it takes the following steps throughout the program:

1. x and y are defined as an int variable.
2. xp and yp are defined as integer pointer variables.
3. x is set to 5, and y is set to the same value as x, so 5 as well.
4. xp is set to the memory address of x, and yp is set to the memory address of y.
5. x is set to 10.

After these 5 steps, the value of x and xp is 10, the value of y and yp is 5, and the program looks like this:

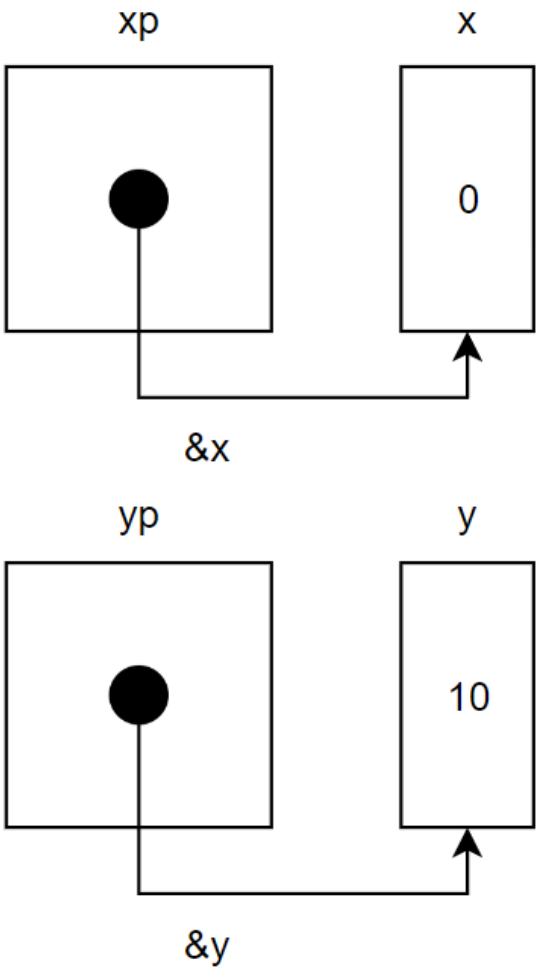


Exercise 4 - Function 2

The program for this exercise takes the following steps:

1. x and y are defined as an int variable.
2. xp and yp are defined as integer pointer variables.
3. x is set to 5 and xp is set to the memory address of x.
4. x is set to 10 and y is set to the value of the memory address that xp points towards.
5. yp is set to the memory address of y.
6. The value of xp is set to 0.

After these 6 steps, the value of x and xp is 0, the value of y and yp is 10, and the program looks like this:

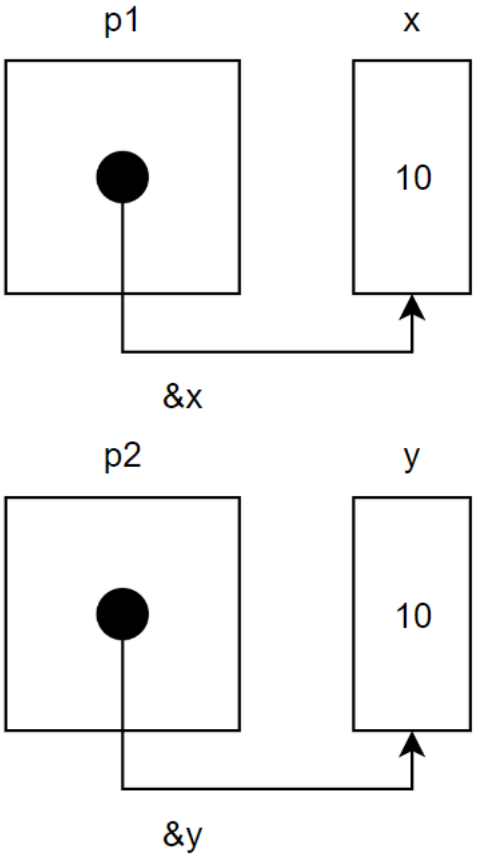


Exercise 5 - Function 3

The program for this exercise takes the following steps:

1. x and y are defined as an int variable.
2. p1 and p2 are defined as integer pointer variables.
3. x is set to 5 and y is set to 10.
4. p1 is set to the memory address of x and p2 is set to the memory address of p1.
5. The value of p2 is set to y and p1 is set to the memory address of x.

After these 5 steps, the value of x, y, p1, and p2 is 10, and the program looks like this:



Exercise 6 and 7

For exercise 6 and 7, see the github repository below:

https://github.com/Aarhus-University-ECE/assignment-5-A-Emilia