Qatar University		Programming Concepts
College of Engineering		CMPS151
Dept. of Computer Science & Engineering		Fall 2020
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QUIZ 4

Write a C++ program that calculates, prints and saves in a file the number of possible permutations of **r** items in a set of $\boldsymbol{n}$ elements.

- Your program should keep asking first the user to enter a number $\boldsymbol{n}$ **between 3 and 10**.
- Once the user enters a valid number n, the program should keep asking the user to enter a number **r** that has to satisfy $\mathbf{1} \leq \boldsymbol{r} \leq (\boldsymbol{n} - \mathbf{1})$.

- Once the user enters a valid number r, a for loop should be used to compute the number of permutations $\boldsymbol{P}$ as follows:

$$\boldsymbol{P} = \prod_{k=n-r+1}^{n} k \ = (n-r+1) \times (n-r+2) \times (n-r+3) \times \ldots \times n$$

In fact, P is the product of all the numbers from $(n-r+1)$ till n.

- After computing P, the program should display the number P, then save n, r and P in a file called "Permutations.txt"

Example and sample run

For example, if $n = 6$, and $r = 4$, then P is the product of all the terms from (6-4+1)=3 till 6, i.e. $P = 3 \times 4 \times 5 \times 6$=360.

Below a sample run:

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```
Please enter n between 3 and 10: 17
Please enter n between 3 and 10: 6

Please enter r between 1 and 5: 7
Please enter r between 1 and 5: 4

The number of permutations of 4 items in a set of 6 elements is : 360
```

And the file "Permutations.txt" should look like this

```
6  4  360
```

```
#include <iostream>
#include <fstream>

using namespace std;

int main()
{
   int n , r , p=1 ;
   ofstream outfile ;
   while(n<3 || n>10)
   {
      cout<<"Please enter n between 3 and 10: ";
      cin >> n;
   }
   while(r<1 || r>n-1)
   {
      cout<<"Please enter r between 1 and "<< n-1<<" : ";
      cin >> r;
   }
   for(int k = n-r+1; k<= n; k++)
   {
      p = p*k;
   }

   cout<< "The number of permutations of "<<r<<" items in a set of "
        <<n<<" elements is : "<< p << "\n" ;

   outfile.open("Permutations.txt");
   outfile << n <<' '<< r <<' '<< p;
   outfile.close();

   return 0;
}
```