Data Structures and Algorithms Kurt Kent H. Alabado

Assignment 1 ITE231

1.) Finding the factorial of a number

Algorithm:

1. First input a number that we want to find the factorial of and assign it to the variable '$n'.
2. Then function checks if n is equal to 0, if it is the function returns 1.
3. If n is not equal to 0, the function multiplies the number by the factorial of the number minus 1.
4. This process is repeated, with the function calling itself with a smaller number each time, until it reaches 0.
5. Once the function has calculated the factorial, it returns the result. (assigned to the variable '$result')
6. The script then prints the result, stating the factorial of the original input number.

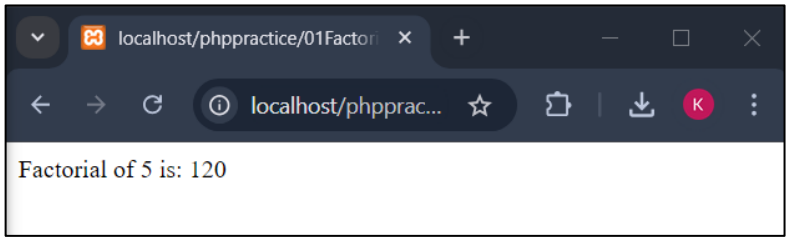
PHP Code:

01FactorialAlgo.php 02isPrimeAlgo.php 03MaxNumberAlgo.php

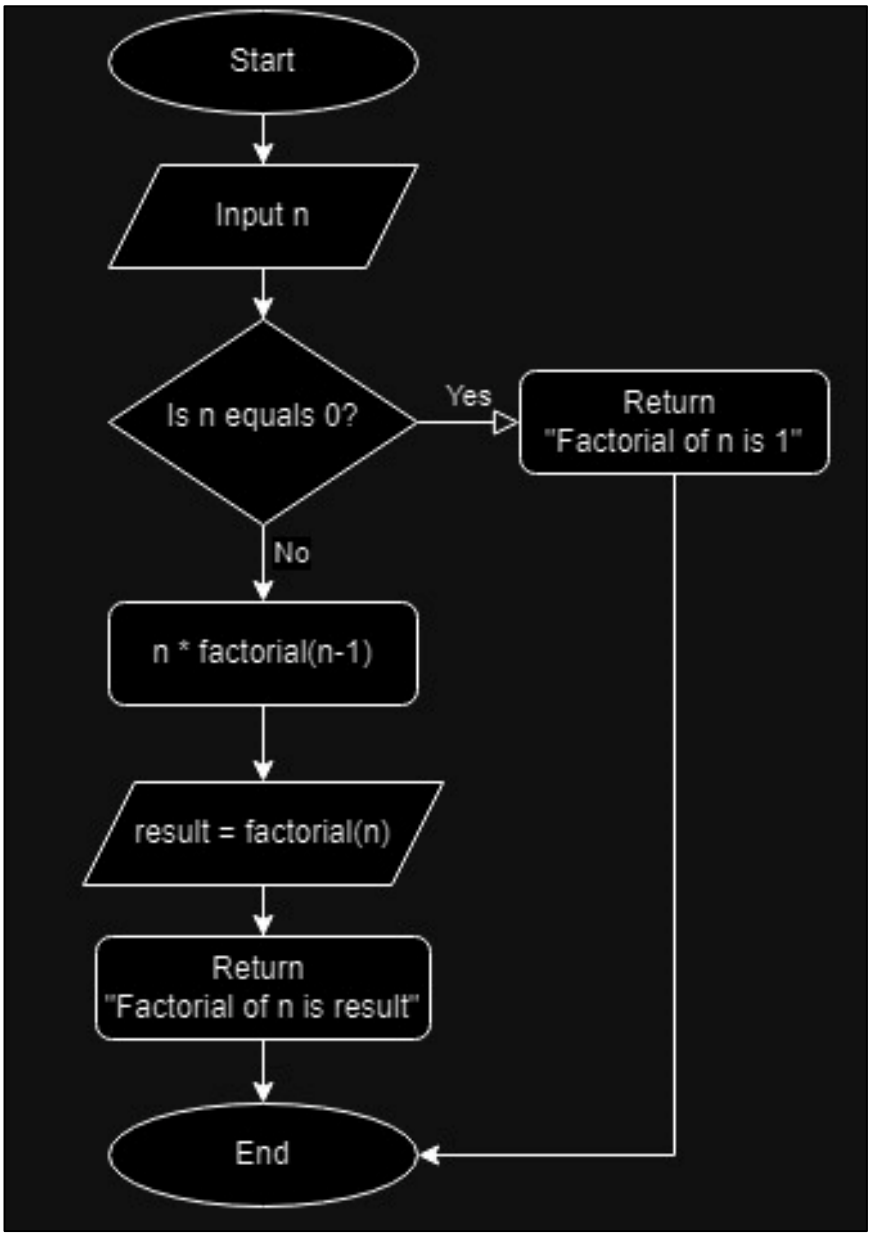
C: > xampp > htdocs > phppractice > 01FactorialAlgo.php

```php
<?php
$n = 5;
function factorial($n) {
    if ($n == 0) {
        return 1;
    } else {
        return $n * factorial($n - 1);
    }
}

$result = factorial($n);
echo "Factorial of $n is: $result";
?>
```



Flowchart:

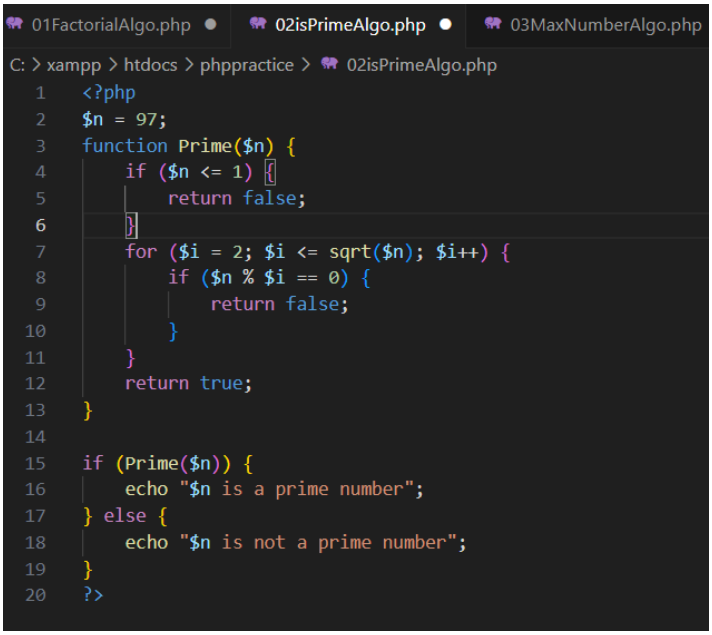

Start
Input n
Is n equals 0?
Yes
Return
"Factorial of n is 1"
No
n * factorial(n-1)
result = factorial(n)
Return
"Factorial of n is result"
End

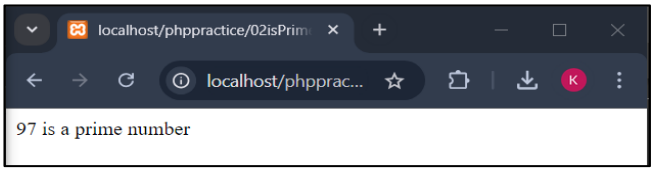
2.) Checking if a given number is a prime number

Algorithm:

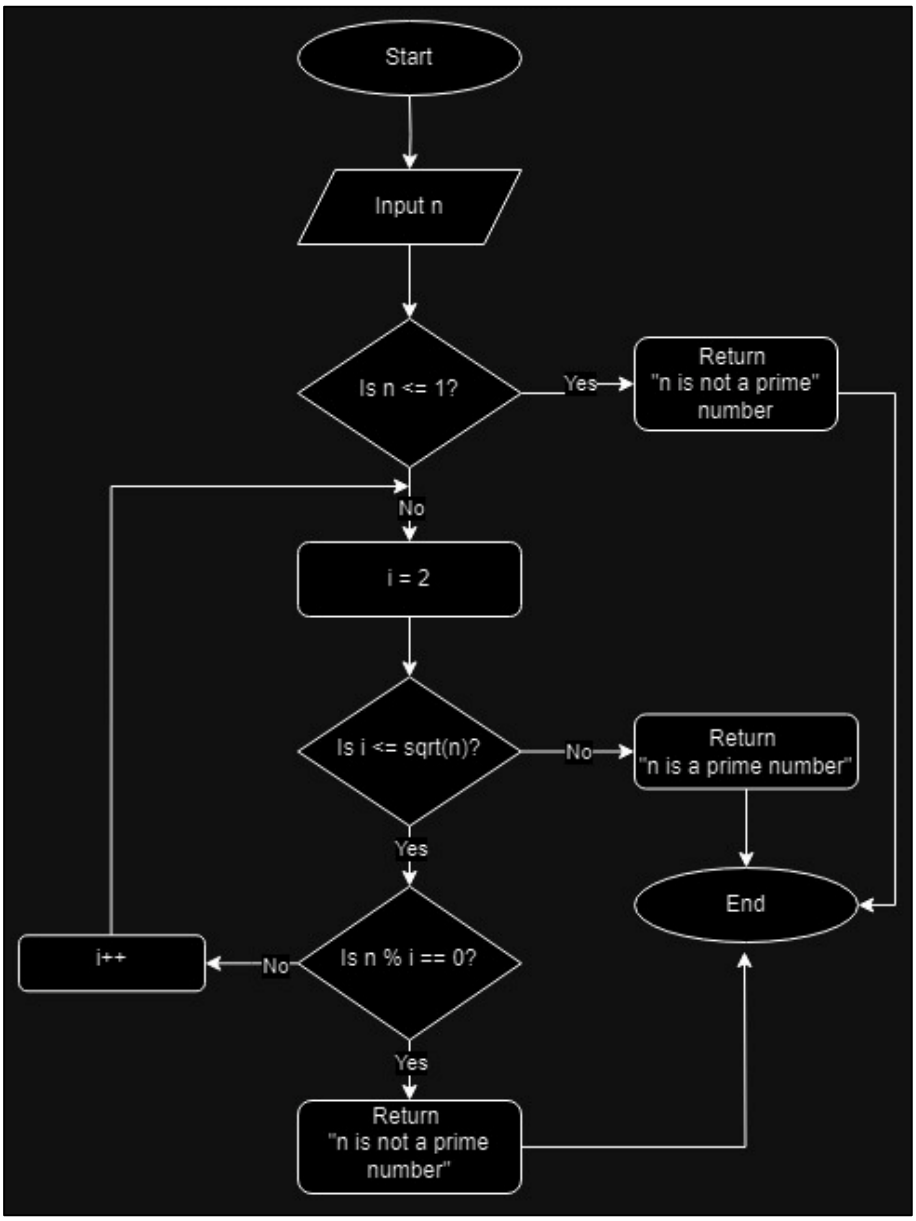
1. First input a number that we want to check if it is a prime number and assign it to the variable $n.
2. The function first checks if the input number is 1 or less since prime numbers are larger than 1. If it is 1 or less, the function prints a statement saying the number is not prime.
3. The function then starts checking if the number can be divided evenly by other numbers, starting from 2.
4. The function keeps checking for divisors up to a certain point, which is the square root of the number.
5. If the function finds a number that can divide the input number evenly, it means the input number is not prime.
6. If the function doesn't find any divisors, it means the input number is prime.
7. The function then reports whether the input number is prime or not.

PHP Code:





Flowchart:


Start
Input n
Is n <= 1?
Yes
Return "n is not a prime" number
No
i = 2
Is i <= sqrt(n)?
No
Return "n is a prime number"
Yes
End
Is n % i == 0?
No
i++
Yes
Return "n is not a prime number"

3.) Finding the maximum number from 3 numbers inputted by the user

Algorithm:

1. First, let's initialize three variables: $a, $b, and $c. We need to set these variables to the numbers we want to compare.
2. Next, we'll compare $a with $b and $c to see how they stack up. This is where we start to figure out which value is the largest.
3. Now we check if $a is greater than or equal to both $b and $c. If this condition is true, it means $a is the largest of the three values.
4. If that's the case, we'll assign the value of $a to $max. This is because we've determined that $a is the largest value.
5. If not, we'll compare $b with $a and $c to see if it's the largest. We're giving $b a chance to be the largest if $a wasn't.
6. Now we check if $b is greater than or equal to both $a and $c. If this condition is true, it means $b is the largest of the three values.
7. If it is, we'll assign the value of $b to $max because we've determined that $b is the largest value.
8. If neither of those conditions is true, we'll assign the value of $c to $max. This means $c is the largest value by default.
9. Now we output the value of $max as the maximum number among $a, $b, and $c.

PHP Code:

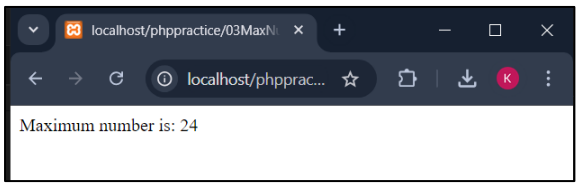
01FactorialAlgo.php | 02isPrimeAlgo.php | 03MaxNumberAlgo.php

C: > xampp > htdocs > phppractice > 03MaxNumberAlgo.php

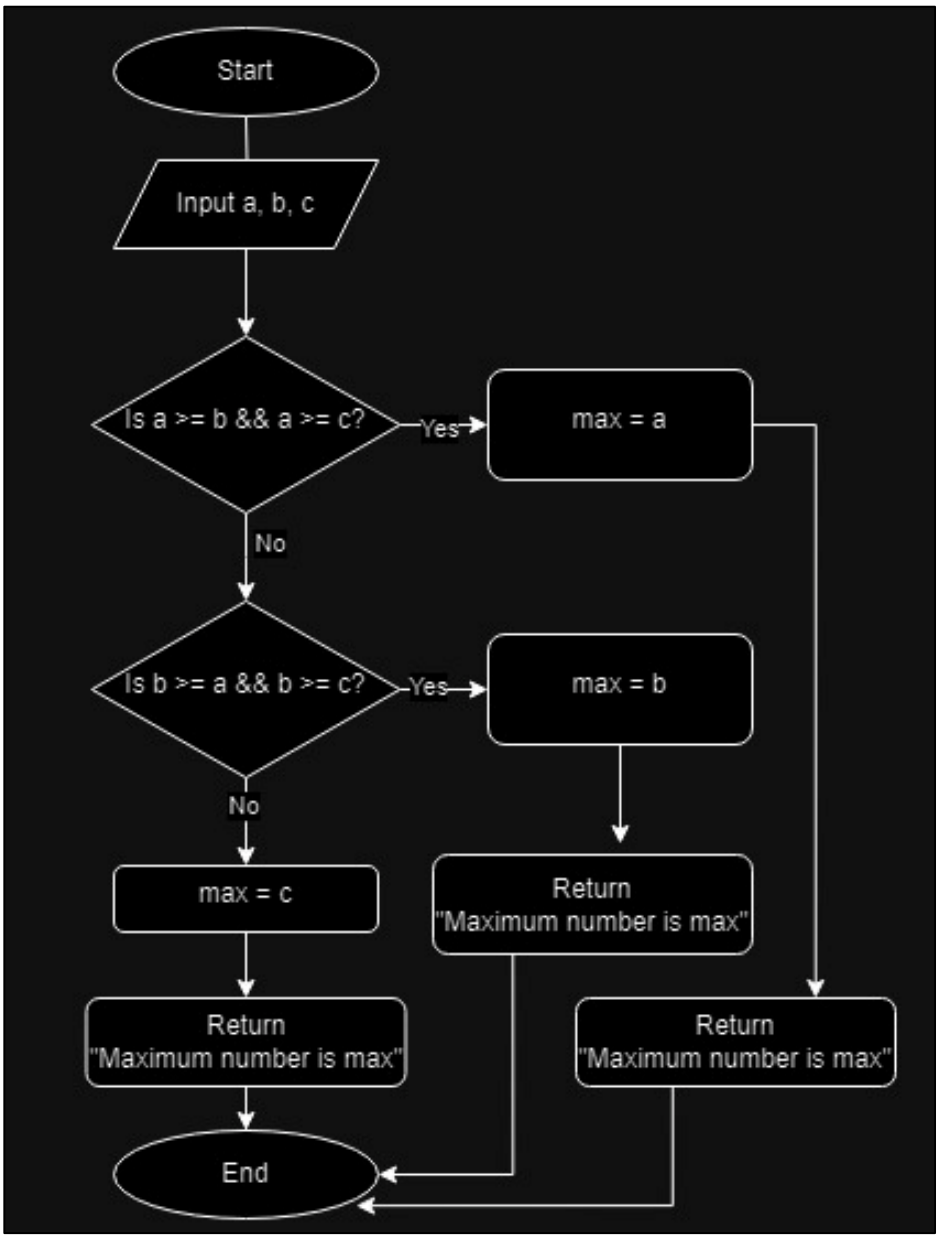
```php
<?php
$a = 23;
$b = 24;
$c = 8;

if ($a >= $b && $a >= $c) {
    $max = $a;
} elseif ($b >= $a && $b >= $c) {
    $max = $b;
} else {
    $max = $c;
}

echo "Maximum number is: $max";
?>
```



Flowchart:


Start
Input a, b, c
Is a >= b && a >= c?
Yes
max = a
No
Is b >= a && b >= c?
Yes
max = b
No
max = c
Return "Maximum number is max"
Return "Maximum number is max"
Return "Maximum number is max"
End