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CMPS 390

**­Code**

/\* This program calculates summations and factorials by passing a number into methods outside of the main method to do each calculation. It uses four methods: iterativeFactorial(int num), recursiveFactorial(int num), iterativeSummation(int num), and recursiveSummation(int num). \*/

public class Recursion{

public static void main(String[] args){

int num1 = 23;

int num2 = 25;

int iterFactAnswer = iterativeFactorial(num1);

System.out.println("By iteration, " + num1 + "! = " + iterFactAnswer);

int recurFactAnswer = recursiveFactorial(num1);

System.out.println("By recursion, " + num1 + "! = " + recurFactAnswer);

int iterSumAnswer = iterativeSummation(num2);

System.out.println("By iteration, the summation from 1 to " + num2 + " = " + iterSumAnswer);

int recurSumAnswer = recursiveSummation(num2);

System.out.println("By recursion, the summation from 1 to " + num2 + " = " + recurSumAnswer);

} // close main

/\* Method: claculate factorial by iteration \*/

static int iterativeFactorial(int num){

int j;

int prod = 1;

for(j = 1; j <= num; j++ ){

prod = prod \* j;

}

return prod;

}

/\* Method: calculate factorial by recursion \*/

static int recursiveFactorial(int num){

int j;

int prod;

if(num == 1){

return 1;

}

else{

return num \* recursiveFactorial(num -1);

}

}

/\* Method: calculate summation by iteration \*/

static int iterativeSummation(int num){

int j;

int sum;

sum = 0;

for(j = 1; j <= num; j++){

sum = sum +j;

}

return sum;

}

/\* Method: calculate summation by recursion \*/

static int recursiveSummation(int num){

int j;

int sum = 1;

if(num == 1){

return 1;

}

else{

return num + recursiveSummation(num - 1);

}

}

}

**Running**

A screenshot of a computer program

Description automatically generated

**Method: Factorial calculation by iteration**

**A screenshot of a computer program

Description automatically generated**

**Method: Factorial calculation by recursion**

**A screenshot of a computer program

Description automatically generated**

**Method: Summation calculation by iteration:**

**A screenshot of a computer program

Description automatically generated**

**Method: Summation calculation by recursion:**

**A screenshot of a computer program

Description automatically generated**