RECURSION 03

Hello guys, i hope you would have seen the concept of factorial of a number, let me just give you a brief over view of what it is. Factorial of a number is nothing but you keep repeatedly multiplying the number starting from one till you reach the given number and what is the answer you get is nothing but you call as a factorial of a number, let me give you an example. Let us take the number four, start with one, next number it is we have not reached four yet so take the next number two multiply it one into two is two, still we have not reached four so take the next number three multiply it two into three is six we have not reached four so take the next number it is four we have reached four so with this multiplication we need to stop so till now we got the six as the answer of multiplication and multiply four to it you get twenty four that is your answer so we say factorial of four is twenty four that is one into two into three into four is twenty four that is what you call as factorial of a number. You start from one and keep multiplying the next numbers until you reach the given number ‘n’ to get the factorial of the number ‘n’, if ‘n’ is the given number, in my case its four n is equal to four, so if the given number is n you start off with one two three and so on till you reach n keep multiplying and what is the final answer you get is what you call as ‘n’ factorial ok so how would we programme it? As you would have guessed from the procedure of calculation i had said we can do it using iteration let us do that so i said factorial, that is the functionality we need so let us define a functionality factorial for we need to find the factorial of given number ‘n’ so let me define n here ok so i need to start from one and go till i reach n so we can use for loop right? But for loop uses the function range to deal with numeric values and as you would have seen in your previous videos and till you practice you had till now range function would take if you ask for range of five it would start by default zero and it will count till four that if you would say five it will count one less than that, that is how it does. But we want it to start form one and we want it to count till n ok so we need to tweak in the range function to get this thing so we can define the start value for the range function if we don’t give a start value till now we had an given the start value for most of our programs so if we don’t give a start value the default start value is taken as zero but we can tweak in we can give some start values as well so let me do that in this program so i need to store the product so let me a variable call product so initially we have one as the product because with one of you multiply anything you will get the same number as the answer so you keep multiplying but from where will you start one into one into two into three into four into up to n this is how this has to been done right, so we have to start our multiplication from one let me define something called as product which carries the value one initially ok, so let me use the loop to iterate over the range that is to move over the range of numbers from one till n so i need to start from one so let me for i in range of i can give a start value as i had said start value one comma stop value, so whatever is the stop value it will stop one less than that, i want to stop at ten so what should i be giving here? N plus one a simple tweak so in this range that is from one to n plus one that is one two three it will count up to n so this is what we wanted we had taken that value as ‘i’ whatever is the new product after taking this ‘i’ will be whatever the product till now multiply with ‘i’ i hope you understand this that is if i want the factorial of three

whatever is the product how will i do? One, one into two is two till now my product is two, two into three is six this is how i take the factorial so whatever is the product we had computed till now that product into this particular value of 'i', this is how we compute the factorial. So at the end of the loop that is till you have reached 'n' whatever you keep multiplying, whatever is the product that is your answer so you have to return the product here so this particular functionality will take a number 'n' find its factorial and return the answer that is what it is doing. So let me, i have to use this functionality i have define the functionality now i am going to use this functionality so let me take an input sorry input, input generally takes in terms of strings in Mac so i need to type cast into int this is a Mac dependency that's it, it may differ from operating system to operating system with practice you will get to know how your operating system expects your input syntax to be, based on that you please modify this i am doing this with correspondent to Mac so i am type casting it i am typing it the input let me say enter the number i will get a number but see factorial is defined only for positive numbers for negative numbers factorial is not defined, in mathematically factorial is only defined for positive numbers. If the number zero is given what is the case, if zero factorial has been defined as one that is the mathematical definition that is why see i had defined the product as one, in case if i given zero for i in range one comma one so it will not at all go inside the loop it will directly return the value of one here so this is like a dual advantage sort of thing, zero factorial is one also one is the number with which you multiply any number you will get back the same number so these are the research why we started off with the initial product value with one here. Ok you can start give zero but not any negative number i will enter a positive number so let me give a clear message enter a positive number i am asking you to enter a positive number if the user still enters the negative number we should be smart enough and we should not allow this input so i should check it, if 'n' is less than zero that is it is a negative number i should display the message that factorial is not defined on negative numbers, on negative numbers see why we are doing this is this is what we call as fault tolerant major if the user has mistake given the some input which is actually incorrect we should not throw at him some random search and terrify him, we should give him a polite message so that he can understand what mistake he has done, he will not repeat it so this i one of the software engineering principle we are following, if 'n' is less than zero you that is it is a negative number say that factorial is not defined on negative numbers else let me say factorial so let me say f for factorial, i will get back the answer i will call factorial of 'n' so i had called the factorial of 'n' so it will return an answer right that answer be captured in f so now i have to print it. So let me print it print let me say factorial of 'n' is f that is 'n' factorial is 'f' that is what we wanted to be printed. So let me save the code let me run it or may be i will give you a brief info, it will take an input it will check if it is a negative number, for negative numbers since mathematically factorial is not defined we display the message that it is not define, if it is a positive number it will start computing the factorial, how factorial is computer is? You start off from the number one and keep multiplying the consecutive numbers till you reach the given number n, at the end of this multiplication whatever is your answer is what you call as the factorial so you return that particular product and you print it here, factorial of n is this you are printing it this is how the working is let us execute the programme let me run it ok, it is asking me to enter a positive number let me show you let me enter a negative number see factorial is not defined on negative number so

this particular thing is fine ok so let me run again with the correct input positive input let me give a number six, ok factorial of six is seven two one into two into three into four into five into six is seven twenty that is what is displayed as the answer here fine? So our programme works fine this is not the only way to calculate factorial there is another way as well so you can understand that way for that please do observe the solution try, try enumerating running programme on different inputs, you will find some pattern if you are able to crack the pattern you will understand the alternative way of calculating the factorial. Thanks for watching till now have a nice day.