IIT Madras

ONLINE DEGREE

Programming in Python
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Introduction to Functions

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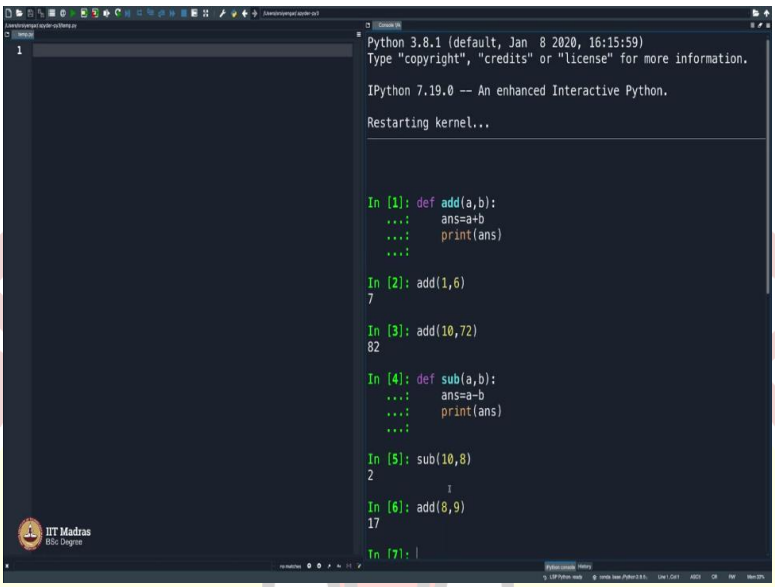

So, let me teach you the theme of this week's discussion by getting into my terminal, and I will start to code. I will not explain what I am doing, and I will try to see if you can figure out all by yourself what I am trying to do. Look at this, I will say def, and then say, add and then I will say a comma b, and then close the bracket, put a colon, and then I will say, print. Answer equals a plus b, say print answer. And then I will close it. And what is this?

What will this do? It did not even show anything. What the word you mean by def here? I say print ans, but then nothing is getting printed. You do not even know what is a and b, did not even say that you have not declared a and b, what are these variables that you are using, etcetera, etcetera. So, let me go ahead and show you print add, I am sorry. So, if I just say add 1 comma 6, it is showing 7 but say I add 10 comma 72, it is showing 82.

You see what is happening here? I am declaring a new word called add, I am defining add as something that will take two variables a and b, it took two variables 1 and 6. And then inside this room, I am defining a room where some calculations take place, it adds the numbers a and b assigns it to ans and then prints ans, whatever that is, and hence, you are getting 7 here, the moment you put this. You are getting 82 here when you put this.

Let us do something more. Let me say, define, subtract a comma b, I will say ans equals a minus b, and then I will say print ans. And then I will say sub 10, comma, 8, you get 2. But

still, if I say add 8 comma 9, you will get 17. So, you are defining new commands, I would say, the word that is easy on the mind in this stage for you all, is you are creating your own commands.

In other words, you are creating your own in the language of Python, what you are doing is called creating your own functions. You are defining what should do what, and they are doing as per your instruction. Stare at the monitor, and then try to figure out what I have done here. I

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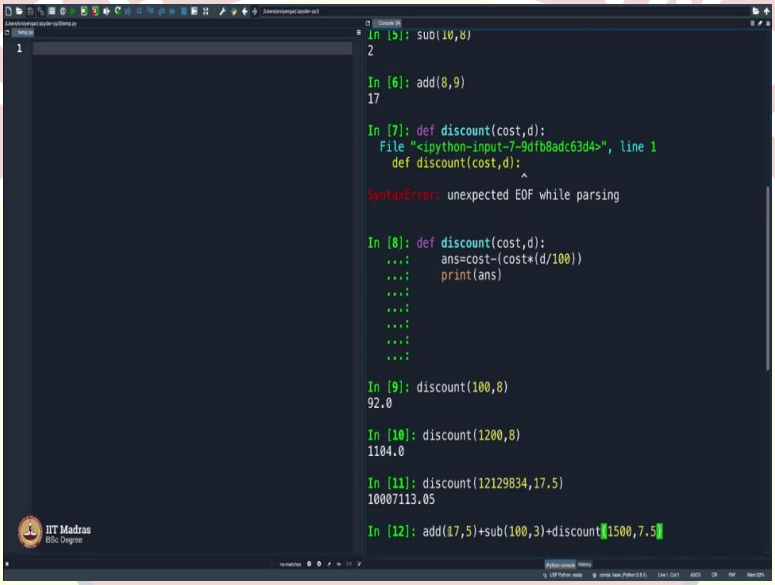

I will go little ahead and try to write a not so straightforward function. I will say def discount, let us say cost comma d, d for discount. So, and then define discount cost comma d and then what will be the discount if the cost is some 100 rupees and you have a discount of 10 percent it should be 90 rupees. So, what do you should answer should be equal to whatever was your cost, you need to subtract the d percentage of the cost. Now what would that be? This would simply be cost times d if it is 10 it is d by 100.

So much you will subtract, assuming you all know what is discount, even I do not know what is discount. I believe this is discount if the answer turns out to be incorrect, then we will get back and then fix it. So cost, answer equals cost minus of a portion of the cost you remove that from here. So, let us see, if we can print this. I have made a small mistake here. I need to close the brackets, which I did not here that is why it is not stopping.

So, now def, discount cost comma d answer equals so much print answer. Let me see what is the discount for 100 rupees the discount were to be 8 percent. Well, my knowledge of

discount is not has not expelled. I believe it is right. So, let me write a complicated formula for 1,200 what is 8 percent discount, it gives me 1,104 probably can check.

So, 8 into 12 is 96, 96 minus 200, 1,200 is 1,104 yes, I am right, so you can now write some complicated numbers and some 17.5 percent of this discount is so much. The idea here is the comfort with which you can define something, and you can keep using it. So, for instance, you can say, add 17 and 5, and add the difference of 100 and 3 to it, and add discount of sum 1,500 rupees at, let us say, 7.5 percent, whatever this means. So, this throws up an error.

Why is that? When I say add 17, comma 5 it simply displays what is 17 plus 5. I expected distribute 22 plus 97 plus discount of 1,500 comma 7.5. That is not happening. Why is not it happening that is because add of 17 comma 5 does not give you a number here. Unless you see, had you done 17 plus 5. And let us say plus 100, minus 3, so it would give you the answer. But my functions that I have written is not doing that, simply because let me go up and then see what is happening here. I say, define add a comma b, I only print it.

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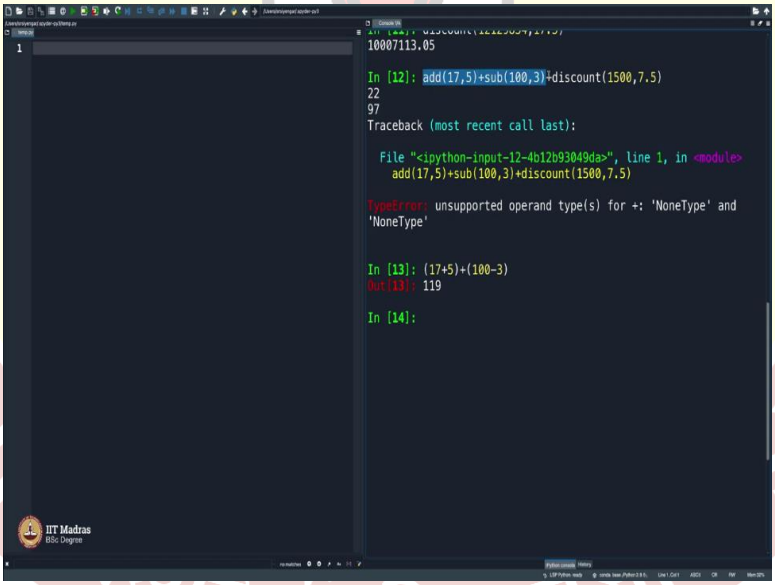

Is there any way I can return the sum of a and b of this function, so that you can go ahead and use it like this. So, let us see that on this side of my editor.

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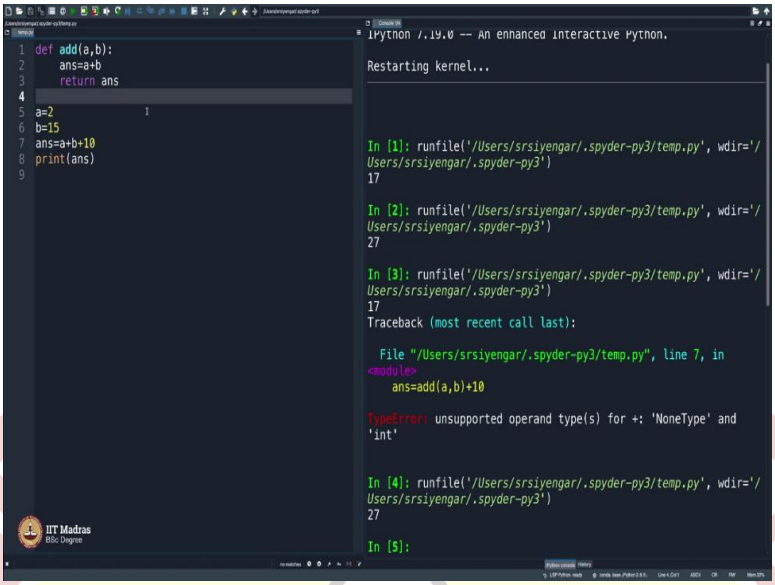

So, what I will now do is I will define add a comma b then I will say answer equals a plus b and then I will say return ans. Please note the word return. Return in day-to-day terms means you are returning your Amazon package for whatever reasons, that is the word return, that is how we use return in English. But then here in programming, by return, we mean this function will, the moment you call this function, it will assign this value to the function.

What do I mean by that? If you can stay patient, you will observe what I mean by that b equals let us say 15, I say print, add a comma b. And what this does is, it comes to print, as you can see it is showing 17 here, it comes to print, it calls this function add. Moment, it sees add it goes here and sees what have you defined here. This would never happen, you see. In your typical Python program, it would start from the top and then keep going till the bottom, but here, whenever you call, you have defined a function add, and you call the function add here.

Moment you call it, it goes here, whatever is a and b, 2 and 15 it puts it here, computes the value, answer and then gives you the answer. And that is what you are printing here. So, now look at this. Let me remove this and then what if I say add a and b and add 10 to this. And assign this to answer. Whatever this means, for whatever reasons I am doing this and I will print answer. It is giving me 2 plus 15 plus 10, 27.

Instead of return, if I were to say print answer this will throw up an error here because add of a comma b in this place, you are simply printing. You are not putting a value here. If you want a value to be replaced here, you must say return answer. Nevertheless, we will try executing this and see what it has to abuse us off.

So, it says type error unsupported operand type for plus, none-type and int, you know what it means. If you have understood some, the type concept that we taught to you long back you will understand this error message but do not break your head much. We are not here to read the details of the error message. The point is, it is throwing an error and we know why. It is because we are printing something. We should not be printing something we should be returning the answer.

So, this may look like, why are we trying to use a big knife to big axe to cut a flower? This is like a small flower that we are trying to cut. Why even do the circus of define add a comma b? Why not simply put a plus b here. Remove this and put a plus b, boom, still, you can answer 27. Why do we do this? The idea is, I use this as an example. Things will get very complicated and you will observe how these functions come in very handy. Mainly on your mind.

I repeat that, functions are useful mainly for your mind because you stay very organized and you think in a very, very what is called a modular form, where you break your idea into modules and then solve them slowly.

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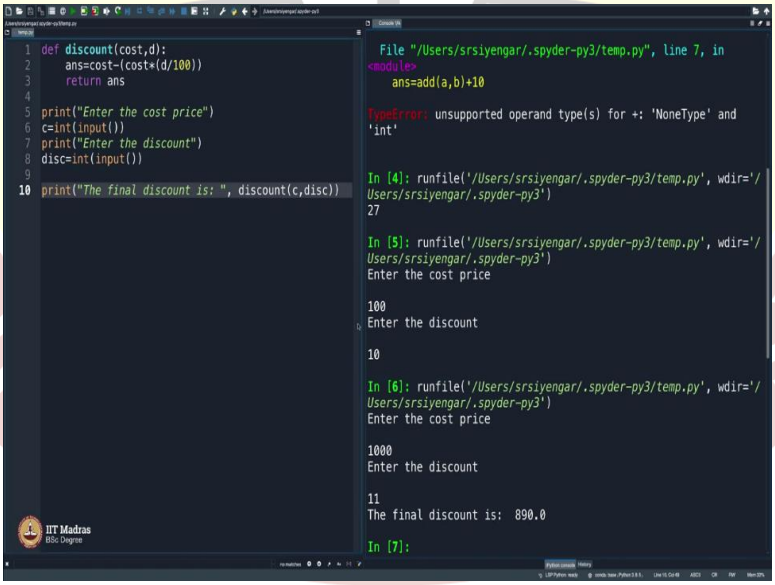

So, what we will do is we will delete this and try to write the discount function. Define discount the amount which was the cost, and then what was that variable I use disk or d? So, d, I think it was d, so let me use d itself here. And what was the answer that I printed? I said, answer is equal to the cost. And you are going to subtract the d proportion of the cost.

So, if it is 10 percent, you take 10 percent of cost, which is 10 by 100 times cost and you subtract from cost. So, if this does not make sense, then you may want to revise what you mean by discount or spend a couple of minutes time in writing down do not refer to a book or to understand what is discounting, I want to figure out by a pen and paper, because it is sort of very, very, very straightforward.

So, I say, return answer. So, print enter the cost, price, c equals input. And as you know, this should be an integer, so I will say int of input and then I will say, enter the discount. And discount will be this disc, there is a reason why I am calling it disc here, you will get to know in a minute. You can commander, why not use cost and d here. You can indeed do that, but I am for some reason using it this way. Alright. Let me simply execute it.

In fact, it is not calling the function I just want to see that nothing is going good, 100 rupees discount is 10 percent. It is not showing anything because I am not showing anything here. So, what I will now do is print the final discount price is, what is that discount, simply put your c here, simply put your disc here. Then see what comes whatever you enter 1,000 rupees, 11 percent discount, 1,000 minus 110 is 890. The final discount is 890 it says. You must now be wondering what is cost commodity here I use some variable here, and it say c here and disc here and then pass that here.

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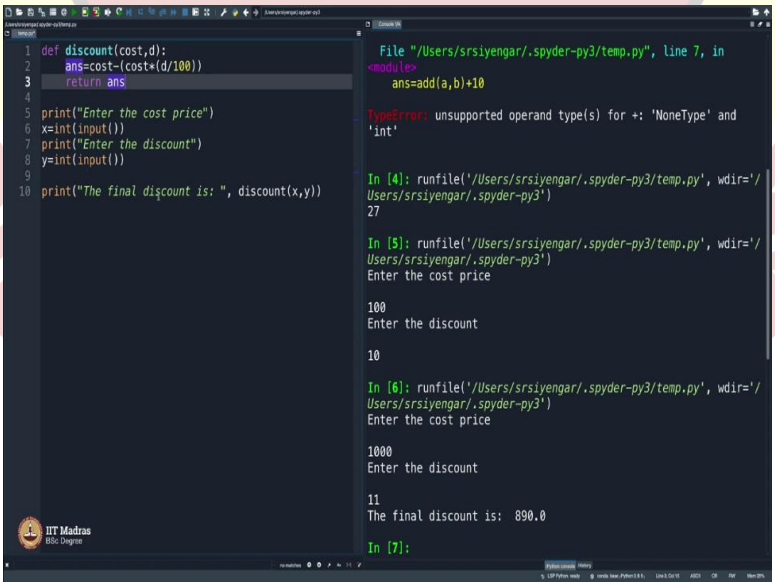

So, please note, the way this functions is the following. You did not put c here you can simply put x here and y here. But here, you must also put x and y. What am I saying? I will make it clear in a minute. Moment you say discount x comma y, your computer does the

following. The moment it sees a new word discount, it tries to go and search have you defined what the discount is?

Moment it goes here it sees there is something called discount here, and let us see what variables are here. You have a cost you have d, so it assumes x to be your cost and your y to be your d. Whatever you put here, it will take in that order. It is like if you if this if my nickname is Sudhi it takes me as Tom here, but you enter as Sudhi here. It takes Sudhi a Tom and does operations on Tom here, that is it.

So, as and always, as you can see whatever number you enter here, whether it is x or y or whatever, the first one is called cost the second one is taken as d and you go ahead inside the function doing your manipulation and finally return whatever you want to return which is the answer here. So, if it is confusing, do not worry at all it takes time for you to get a hang of it.

We are going this entire week is going to be a lot of discussion on functions. As we proceed, things will be very, very, very clear. So, bear with me, if things are appearing very complicated you may want to watch this video a couple of times or maybe a dozen number of times until you understand what is what are functions better even try coding try writing your own code and figure out how you can use functions. Now let us go ahead and write a non-trivial program, which will help you understand what functions are.