1. What is a Module?

A **module** is simply a **Python file** (.py) that contains code — like functions, or variables — which you can **import and use in another file**.

> 💡 Think of it like a **toolbox** — once created or imported, you can use all the tools (functions or variables) inside it without rewriting them.

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2. Types of Modules

Python gives you **three types of modules**:

Type	Example	Use
🔹 **Built-in modules**	math, random	Come with Python automatically
🔸 **User-defined**	Your own .py files	You create and import them
🧩 **External modules**	pandas, numpy	You install using pip (extra powerful tools)

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3. Importing a Module

✅ Full Module Import

```
import math

print(math.sqrt(16))  # 4.0
```

✅ Import Specific Function

```
from math import sqrt

print(sqrt(25))  # 5.0
```

✅ Import with Alias

```
import math as m

print(m.pow(2, 3))  # 8.0
```

📘 4. Some Popular Built-in Modules

Module	Use	Example
math	Math functions like sqrt, pow	math.sqrt(16)

random	Random number generator	random.randint(1, 100)
datetime	Date & time functions	datetime.datetime.now()
os	File, folder handling	os.mkdir("folder")
time	Time delay, current time	time.sleep(2)

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5. Your Own Module (User-Defined)

Let's say you create a file called mymath.py:

```
# mymath.py

def add(a, b):

    return a + b
```

Now you can import it in another file:

```
import mymath

print(mymath.add(5, 3))  # 8
```

🔁 You can reuse your code across multiple projects this way!

⚠️ 6. External Modules (Need to Install First)

Some powerful modules are not built-in. You install them using:

```
pip install module_name
```

Example:

```
pip install numpy
```

Then use in your code:

```
import numpy as np
```

✅ Benefits of Using Modules

✅ Organize large code into smaller files
✅ Avoid writing the same code again and again
✅ Use powerful libraries made by experts
✅ Make your code cleaner and easier to maintain

Practice Questions

1. Use the math module to:

    - Find square root of 64
    - Get the value of π (pi)
    - Find factorial of 5
2. Use the random module to:
    - Generate a random number between 1 and 10
    - Pick a random item from a list
3. Create a module called greetings.py with a function:

```
def welcome(name):
    print("Welcome", name)
```

Import and use it in another file.

4. Import only the sqrt function from math and use it.

What is a Lambda Function?

A **lambda function** is a **mini function** written in **one line**, usually used for **short tasks**.

> 🎯 It's useful when you need a function quickly, but don’t want to define it using `def`.

✅ Syntax:

```
lambda arguments: expression
```

✅ Examples:

```
# Traditional function

def add(a, b):

    return a + b


# Lambda version

add = lambda a, b: a + b

print(add(5, 3))  # 8
```

```
square = lambda x: x * x

print(square(4))  # 16
```

Practice:

1. Write a lambda to cube a number
2. Write a lambda that checks if a number is even
3. Write a lambda that returns the larger of two numbers
4. Write a lambda that returns "Pass" if marks ≥ 40, else "Fail"

Local and Global Variables

What is a Variable's Scope?

A **scope** defines **where a variable can be used** in your program.

Type	Where it works
Local	Inside the function only
Global	Everywhere in the program

✅ Local Variable:

Defined inside a function. Can only be used **inside** it.

```
def show():
    name = "Amit"
    print(name)

show()
print(name)  # ❌ Error: name not defined
```

✅ Global Variable:

Defined **outside** the function. Can be used **anywhere**.

```
name = "Amit"

def show():
    print(name)

show()
print(name)
```

What if you want to change a global variable inside a function?

Use the **global** keyword:

```
count = 0

def update():

    global count

    count += 1


update()

print(count)  # 1
```

Practice Questions

1. Write a function that defines a local variable inside it. Try to access it outside. What happens?

2. Define a global variable "score" and update it using global inside a function

3. Try to change a global variable inside a function without using global. What error do you get?