1. **Basic Arithmetic Operations**
   Write a Python program to perform addition, subtraction, multiplication, and division on two numbers entered by the user.

```
num1 = float(input("Enter the first number: "))

num2 = float(input("Enter the second number: "))

print("Addition:", num1 + num2)

print("Subtraction:", num1 - num2)

print("Multiplication:", num1 * num2)

print("Division:", num1 / num2 if num2 != 0 else "Division by zero not allowed")
```

2. **Check Even or Odd**
   Determine whether a given number is even or odd.

```
num = int(input("Enter a number: "))

print("Even" if num % 2 == 0 else "Odd")
```

3. **Factorial Calculation**
   Compute the factorial of a given number using recursion.

```
def factorial(n):

    return 1 if n == 0 else n * factorial(n - 1)


num = int(input("Enter a number: "))

print("Factorial:", factorial(num))
```

4. **Prime Number Check**
   Check if a number is prime.

```
num = int(input("Enter a number: "))

if num > 1 and all(num % i != 0 for i in range(2, int(num**0.5) + 1)):

    print("Prime")

else:

    print("Not Prime")
```

Intermediate-Level Programs

1. **Fibonacci Sequence**
   Generate the Fibonacci sequence up to n terms.

```
n = int(input("Enter the number of terms: "))

a, b = 0, 1

print("Fibonacci sequence:")

for _ in range(n):

    print(a, end=" ")

    a, b = b, a + b
```

2. **Palindrome Check**
   Check if a given string is a palindrome.

```
string = input("Enter a string: ")

print("Palindrome" if string == string[::-1] else "Not Palindrome")
```

3. **Count Vowels in a String**
   Count the number of vowels in a string.

```
string = input("Enter a string: ")

vowels = "aeiouAEIOU"

count = sum(1 for char in string if char in vowels)

print("Number of vowels:", count)
```

4. **Bubble Sort**
   Implement the bubble sort algorithm.

```
arr = list(map(int, input("Enter numbers separated by spaces: ").split()))

for i in range(len(arr)):

    for j in range(len(arr) - i - 1):

        if arr[j] > arr[j + 1]:

            arr[j], arr[j + 1] = arr[j + 1], arr[j]

print("Sorted array:", arr)
```

Advanced-Level Programs

1. **Matrix Multiplication**
   Multiply two matrices.

```
def matrix_multiply(A, B):
    rows_A, cols_A = len(A), len(A[0])
    rows_B, cols_B = len(B), len(B[0])
    if cols_A != rows_B:
        return "Matrix multiplication not possible"

    result = [[0 for _ in range(cols_B)] for _ in range(rows_A)]
    for i in range(rows_A):
        for j in range(cols_B):
            for k in range(cols_A):
                result[i][j] += A[i][k] * B[k][j]
    return result

A = [[1, 2], [3, 4]]
B = [[5, 6], [7, 8]]
print("Resultant Matrix:", matrix_multiply(A, B))
```

2. **File Handling**
   Write a program to count the number of lines, words, and characters in a text file.

```
file_name = input("Enter the file name: ")
with open(file_name, 'r') as file:
    lines = file.readlines()
    num_lines = len(lines)
    num_words = sum(len(line.split()) for line in lines)
    num_chars = sum(len(line) for line in lines)
print("Lines:", num_lines)
print("Words:", num_words)
print("Characters:", num_chars)
```

3. **Web Scraping**
   Scrape the titles of a website's articles using BeautifulSoup (requires bs4 library).

```
import requests
from bs4 import BeautifulSoup

url = "https://example.com"  # Replace with a website URL
response = requests.get(url)
soup = BeautifulSoup(response.content, 'html.parser')

for title in soup.find_all('h2'):  # Change the tag based on the website's structure
    print(title.text)
```

4. **Data Visualization**
   Plot a sine wave using matplotlib (requires matplotlib library).

```
import numpy as np
import matplotlib.pyplot as plt

x = np.linspace(0, 2 * np.pi, 100)
y = np.sin(x)

plt.plot(x, y)
plt.title("Sine Wave")
plt.xlabel("x")
plt.ylabel("sin(x)")
plt.grid()
plt.show()
```

Let me know if you want more programs or specific practice problems!

Practice Programs Using Built-in Modules

1. **Using the math Module**
   Write a program to calculate the area of a circle using the math module.

```
import math

radius = float(input("Enter the radius of the circle: "))
area = math.pi * (radius**2)
print("Area of the circle:", area)
```

2. **Using the random Module**
   Write a program to simulate rolling a six-sided die 10 times.

```
import random

print("Rolling the die 10 times:")
for _ in range(10):
    print(random.randint(1, 6))
```

3. **Using the datetime Module**
   Write a program to display the current date and time in a formatted way.

```
from datetime import datetime

now = datetime.now()
print("Current Date and Time:", now.strftime("%Y-%m-%d %H:%M:%S"))
```

4. **Using the os Module**
   Write a program to list all files and directories in the current directory.

```
import os

print("Files and Directories in the current directory:")
for item in os.listdir('.'):
    print(item)
```

5. **Using the time Module**
   Write a program to measure the time taken to execute a block of code.

```
import time


start_time = time.time()
for i in range(1000000):
    pass
end_time = time.time()


print("Time taken:", end_time - start_time, "seconds")
```

Practice Programs Using User-Defined Modules

1. **Creating a User-Defined Module** Create a module called math_utils.py with functions for addition, subtraction, multiplication, and division. Then, import and use it in another script.

math_utils.py:

```
def add(a, b):
    return a + b


def subtract(a, b):
    return a - b


def multiply(a, b):
    return a * b


def divide(a, b):
    if b != 0:
        return a / b
    else:
        return "Division by zero is not allowed"
```

main.py:

```
import math_utils

a = int(input("Enter the first number: "))
b = int(input("Enter the second number: "))
print("Addition:", math_utils.add(a, b))
print("Subtraction:", math_utils.subtract(a, b))
print("Multiplication:", math_utils.multiply(a, b))
print("Division:", math_utils.divide(a, b))
```

2. **Using a Custom String Utilities Module**
   Create a module string_utils.py to count vowels in a string and reverse a string.

string_utils.py:

```
def count_vowels(s):
    vowels = "aeiouAEIOU"
    return sum(1 for char in s if char in vowels)

def reverse_string(s):
    return s[::-1]
```

main.py:

```
import string_utils

string = input("Enter a string: ")
print("Number of vowels:", string_utils.count_vowels(string))
print("Reversed string:", string_utils.reverse_string(string))
```

Advanced Practice with Modules

1. **Using the requests Module**
   Fetch the content of a webpage and print the first 100 characters.

```
import requests
url = "https://www.example.com"
response = requests.get(url)
print("Webpage content:", response.text[:100])
```

2. **Using the json Module**
   Write a program to convert a Python dictionary to JSON format and back.

```
import json

data = {"name": "Alice", "age": 25, "city": "New York"}

json_data = json.dumps(data)

print("JSON Data:", json_data)

python_data = json.loads(json_data)

print("Python Dictionary:", python_data)
```

3. **Using the csv Module**
   Write a program to read data from a CSV file and display it.

```
import csv

with open('data.csv', mode='r') as file:

    csv_reader = csv.reader(file)

    for row in csv_reader:

        print(row)
```

4. **Using the matplotlib Module**
   Plot a simple bar graph.

```
import matplotlib.pyplot as plt

labels = ['A', 'B', 'C', 'D']

values = [10, 20, 15, 30]

plt.bar(labels, values)

plt.title("Bar Graph Example")

plt.show()
```