Introduction to Python Language

Application 03- Loops

1. The Fibonacci sequence begins with the numbers 1, 1, 2, 3, 5, 8,… . Each term after the first two is the sum of the two preceding terms. Write a Python program that asks the user to enter a positive integer *n* and then computes and displays the *n*th term of the Fibonacci sequence.

```
n = int(input(" Enter which Fibonacci number you want (n): " ) )

if n <= 0:
    print("Please enter a positive integer.")
elif n == 1:
    print("The 1st Fibonacci number is 1.")
elif n == 2:
    print("The 2nd Fibonacci number is 1.")
else:
    a, b = 1, 1
    for i in range(3, n + 1):
        c = a + b
        a, b = b, c
    print("The",n,"th Fibonacci number is ",c,".")
```

2. Write a Python program that determines how long it takes for an investment to **double** in value at a specified **annual interest rate**.

Your program should:

- Prompt the user to enter the **annual interest rate (as a percentage)**.
- Assume an initial investment amount of **$1** (since the actual amount doesn't affect the doubling time).
- Use a **while loop** to calculate how many years it takes for the investment to double.
- Display the total number of years required.

Example:

If the user enters an annual interest rate of 5, the program should display:

```
It will take 15 years for the investment to double at an annual rate of 5%.
```

```
rate = float(input("Enter the annual interest rate (in %): "))

initial = float(input("Enter the initial invesment: "))
balance = initial
years = 0

rate = rate / 100    # convert percentage to decimal

while balance < 2 * initial:
    balance = balance + balance * rate
    years = years + 1

print("It will take", years, "years for the investment to double.")
```

2.

```
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balance = initial
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while balance < 2 * initial:
    balance = balance + balance * rate
    years = years + 1

print("It will take", years, "years for the investment to double.")
```

3. A positive whole number n (greater than 2) is called **prime** if it is not evenly divisible by any number between **2** and **√n** (square root of n).
Write a Python program that:

- Asks the user to enter a number n.
- Checks whether the number is **prime**.
- If the number is **not prime**, the program should stop as soon as it finds a divisor.
- Then it should print an appropriate message.

```
import math

n = int(input("Enter a number greater than 2: "))

is_prime = True  # assume it is prime

# check divisibility from 2 to sqrt(n)
for i in range(2, int(math.sqrt(n)) + 1):
    if n % i == 0:
        print(n, "is not a prime number. It is divisible by", i)
        is_prime = False
        break  # stop as soon as a divisor is found

if is_prime:
    print(n, "is a prime number.")
```