

RABBIT PROBLEM

EXPLANATION:

The **rabbit_population()** function calculates the number of rabbit pairs after a given number of months, starting with one initial pair and following a **Fibonacci-like recurrence relation** where each month's population is the sum of the previous two months' populations. The first two months always have 1 pair, and from the third month onward, the population grows based on the mature pairs breeding. The **main()** function provides an interactive interface where users can input the number of months they want to calculate.

The recurrence relation in use here is : **$R(n)=R(n-1)+R(n-2)$ for $n>2$** , which means each month's population is the sum of the populations from the previous two months, mimicking the classic rabbit reproduction problem first proposed by Fibonacci.

```
def rabbit_population(n):  
    if n <= 2:  
        return 1  
    population = [1, 1]  
    for _ in range(2, n):  
        total_pairs = population[-1] + population[-2] # Total pairs  
        population.append(total_pairs)  
    return population[-1]  
  
def main():  
    while True:  
        months = int(  
            input("Enter number of months to calculate rabbit population (or 0 to exit): ")  
        )  
        if months == 0:  
            break  
        if months < 0:  
            print("Please enter a non-negative integer.")  
            continue  
        population = rabbit_population(months)  
        print(f"\nRabbit pairs after {months} months: {population}")  
  
if __name__ == "__main__":  
    main()
```

OUTPUT:

Enter number of months to calculate rabbit population (or 0 to exit): 1

Rabbit pairs after 1 months: 1

Enter number of months to calculate rabbit population (or 0 to exit): 2

Rabbit pairs after 2 months: 1

Enter number of months to calculate rabbit population (or 0 to exit): 3

Rabbit pairs after 3 months: 2

Enter number of months to calculate rabbit population (or 0 to exit): 4

Rabbit pairs after 4 months: 3

Enter number of months to calculate rabbit population (or 0 to exit): 5

Rabbit pairs after 9 months: 34

Enter number of months to calculate rabbit population (or 0 to exit): 10

Rabbit pairs after 10 months: 55