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def gcd(a: int, b: int) → bool:
    if b == 0:
        return a == 1
    else:
        return gcd(b, a % b)

def ETF(number: int) → int:
    count = 0
    for i in range(1, number):
        if gcd(number, i):
            count += 1
    return count

def FLT(a, p):
    if gcd(a, p) == 1:
        return pow(a, p - 1, p)
    return None

def ET(num, mod):
    if gcd(num, mod):
        return pow(num, ETF(mod), mod)
    return None

while True:
    choice = int(input(
        '''
Press:
    1 → Euler Totient Function
    2 → Fermat Little Theorem
    3 → Euler Theorem
Enter your choice: '''))

    match choice:
        case 1:
            number = int(input("Enter a Number: "))
            print(f'Euler Totient of  $\Phi(\{number\})$  :', ETF(number))

        case 2:
            a = int(input("Enter a: "))
            p = int(input("Enter p (a prime number): "))
            result = FLT(a, p)
            if result == 1:
                print(f'Fermat Little Theorem holds True for a={a} p={p}')
            else:
                print(f'NOT FOLLOW: Fermat Little Theorem for a={a} p={p}')

        case 3:
            num = int(input("Enter Number: "))
            mod = int(input("Enter moduli (a prime number): "))
            result = ET(num, mod)
            if result is not None:
                print(f'Euler Theorem result for  $\{num\}^{\Phi(\{mod\})} \% \{mod\}$  :', result)
            else:
                print(f'Euler Theorem does not hold as  $\gcd(\{num\}, \{mod\}) \neq 1$ ')

        case _:
            break

```

OUTPUT:

Press:

- 1 → Euler Totient Function
- 2 → Fermat Little Theorem
- 3 → Euler Theorem

Enter your choice: 1

Enter a Number: 10

Euler Totient of $\Phi(10)$: 4

Press:

- 1 → Euler Totient Function
- 2 → Fermat Little Theorem
- 3 → Euler Theorem

Enter your choice: 2

Enter a: 3

Enter p (a prime number): 7

Fermat Little Theorem holds True for a=3 p=7

Press:

- 1 → Euler Totient Function
- 2 → Fermat Little Theorem
- 3 → Euler Theorem

Enter your choice: 3

Enter Number: 3

Enter moduli (a prime number): 10

Euler Theorem result for $3^{\Phi(10)} \% 10$: 1