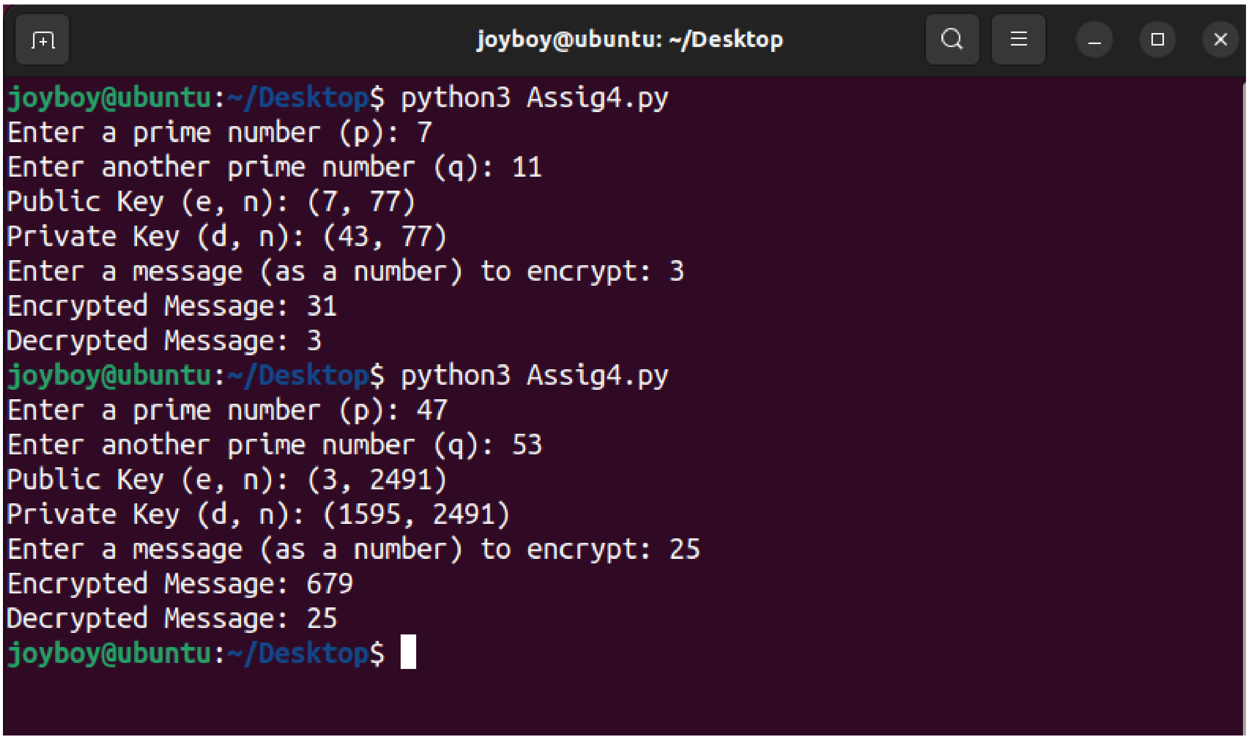
1. input.py

```python
def power(base, expo, m):
    res = 1
    base = base % m
    while expo > 0:
        if expo & 1:
            res = (res * base) % m
        base = (base * base) % m
        expo //= 2
    return res

def modInverse(e, phi):
    for d in range(2, phi):
        if (e * d) % phi == 1:
            return d
    return -1

def gcd(a, b):
    while b != 0:
        a, b = b, a % b
    return a

def is_prime(n):
    if n < 2:
        return False
    for i in range(2, int(n ** 0.5) + 1):
        if n % i == 0:
            return False
    return True

def generateKeys(p, q):
    n = p * q
    phi = (p - 1) * (q - 1)

    e = 2
    while e < phi:
        if gcd(e, phi) == 1:
            break
        e += 1

    d = modInverse(e, phi)
    if d == -1:
        raise ValueError("No modular inverse found")

    return e, d, n

def encrypt(m, e, n):
    return power(m, e, n)

def decrypt(c, d, n):
    return power(c, d, n)


p = int(input("Enter a prime number (p): "))
if not is_prime(p):
    print("p is not a prime number. Exiting.")
    exit()

q = int(input("Enter another prime number (q): "))
if not is_prime(q):
    print("q is not a prime number. Exiting.")
    exit()

e, d, n = generateKeys(p, q)

print(f"Public Key (e, n): ({e}, {n})")
print(f"Private Key (d, n): ({d}, {n})")

M = int(input("Enter a message (as a number) to encrypt: "))
C = encrypt(M, e, n)
print(f"Encrypted Message: {C}")

decrypted = decrypt(C, d, n)
print(f"Decrypted Message: {decrypted}")
```

2. Output



```
joyboy@ubuntu:~/Desktop$ python3 Assig4.py
Enter a prime number (p): 7
Enter another prime number (q): 11
Public Key (e, n): (7, 77)
Private Key (d, n): (43, 77)
Enter a message (as a number) to encrypt: 3
Encrypted Message: 31
Decrypted Message: 3
joyboy@ubuntu:~/Desktop$ python3 Assig4.py
Enter a prime number (p): 47
Enter another prime number (q): 53
Public Key (e, n): (3, 2491)
Private Key (d, n): (1595, 2491)
Enter a message (as a number) to encrypt: 25
Encrypted Message: 679
Decrypted Message: 25
joyboy@ubuntu:~/Desktop$
```