File: millerRabinTest.py

```python
import random

n = int(input("\nEnter a number (>2): "))
if(n <= 2):
    print ("\nInvalid Input!!!\n")
    exit(0)
q = n-1
k = 0
noOfLoops = 100

while(q % 2 == 0):
    q = int(q / 2)
    k = k + 1

print ("\nn = ", n)
print ("n-1 = 2^k * q")
print ("k = ", k)
print ("q = ", q)

def millerRabin(n, k, q):
    a = random.randint(2, n-1)
    x = pow(a, q, n) #pow calculates a^q % n
    if ( x == 1 or x == n-1 ):
        return 1 #inconclusive / probably prime
    for j in range(0, k):
        x = pow(x, 2, n) #pow calculates x^2 % n
        if ( x == 1 ):
            return 0 #not prime / composite
        if ( x == n-1 ):
            return 1 #inconclusive / probably prime
    return 0 #not prime / composite

yes=0
no=0
for i in range(noOfLoops):
    temp = millerRabin(n, k, q)
    if ( temp == 1 ):
        yes = yes + 1
    elif ( temp == 0 ):
        no = no + 1

print ("\nProbability of PRIME: ", float(yes)/noOfLoops)
print ("Probability of not PRIME: ", float(no)/noOfLoops, "\n")
```

```
#OUTPUT

student@student:~$ python3 millerRabinTest.py

Enter a number (>2): 1234567

n =  1234567
n-1 = 2^k * q
k =  1
q =  617283

Probability of PRIME:  0.0
Probability of not PRIME:  1.0

student@student:~$ python3 millerRabinTest.py

Enter a number (>2): 12347

n =  12347
n-1 = 2^k * q
k =  1
q =  6173

Probability of PRIME:  1.0
Probability of not PRIME:  0.0

student@student:~$ python3 millerRabinTest.py

Enter a number (>2): 179426549

n =  179426549
n-1 = 2^k * q
k =  2
q =  44856637

Probability of PRIME:  1.0
Probability of not PRIME:  0.0

student@student:~$ python3 millerRabinTest.py

Enter a number (>2): 32416187747

n =  32416187747
n-1 = 2^k * q
k =  1
q =  16208093873

Probability of PRIME:  1.0
Probability of not PRIME:  0.0
```

```
student@student:~$ python3 millerRabinTest.py

Enter a number (>2): 2

Invalid Input!!!

student@student:~$ python3 millerRabinTest.py

Enter a number (>2): 0

Invalid Input!!!

student@student:~$ python3 millerRabinTest.py

Enter a number (>2): -67

Invalid Input!!!

student@student:~$ python3 millerRabinTest.py

Enter a number (>2): 67

n =  67
n-1 = 2^k * q
k =  1
q =  33

Probability of PRIME:  1.0
Probability of not PRIME:  0.0

student@student:~$ python3 millerRabinTest.py
Enter a number (>2): 17942654

n =  17942654
n-1 = 2^k * q
k =  0
q =  17942653

Probability of PRIME:  0.0
Probability of not PRIME:  1.0

student@student:~$
```