171. Given two integers X=1234 and Y=5678: Use the Karatsuba algorithm to compute the product Z=X x Y

**Test Case 1:**

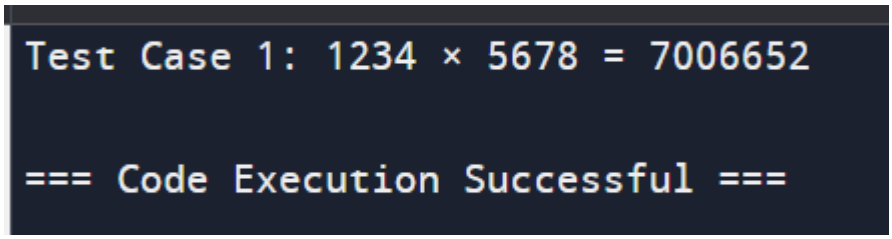
Input: x=1234,y=5678

Expected Output: z=1234×5678=7016652

PROGRAM :-

```
def karatsuba(x, y):
    # Base case for recursion
    if x < 10 or y < 10:
        return x * y

    # Find the number of digits of the maximum of x and y
    max_len = max(len(str(x)), len(str(y)))
    half_len = max_len // 2

    # Divide the numbers into two halves
    factor = 10 ** half_len
    a, b = divmod(x, factor)
    c, d = divmod(y, factor)

    # 3 recursive calls for Karatsuba algorithm
    ac = karatsuba(a, c)
    bd = karatsuba(b, d)
    ab_cd = karatsuba(a + b, c + d) - ac - bd

    # Combine the results using the Karatsuba formula
    return ac * (10 ** (2 * half_len)) + ab_cd * (10 ** half_len) + bd

# Test Case
x = 1234
y = 5678
z = karatsuba(x, y)
print(f"Test Case 1: {x} × {y} = {z}")
```

OUTPUT:-




TIME COMPLEXITY:- O(nlog23)O(n^{\log_2{3}})O(nlog23)