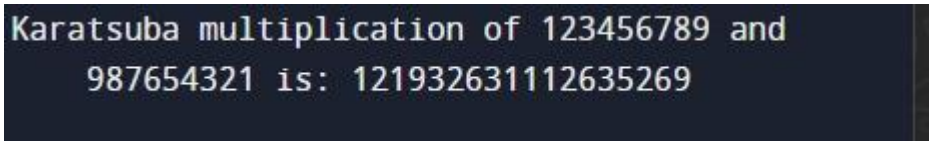


83. Karatsuba algorithm for multiplication

AIM: Karatsuba algorithm for multiplication by using divide and conquer method

PROGRAM:

```
def karatsuba(x, y):  
    if x < 10 or y < 10:  
        return x * y  
    n = max(len(str(x)), len(str(y)))  
    n2 = n // 2  
    high1, low1 = divmod(x, 10**n2)  
    high2, low2 = divmod(y, 10**n2)  
    z0 = karatsuba(low1, low2)  
    z1 = karatsuba((low1 + high1), (low2 + high2))  
    z2 = karatsuba(high1, high2)  
    return (z2 * 10*(2*n2)) + ((z1 - z2 - z0) * 10*n2) + z0  
  
num1 = 123456789  
num2 = 987654321  
result = karatsuba(num1, num2)  
print(f"Karatsuba multiplication of {num1} and {num2} is: {result}")
```



```
Karatsuba multiplication of 123456789 and  
987654321 is: 121932631112635269
```

OUTPUT:

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