

Task Time Complexity

1. Prime check

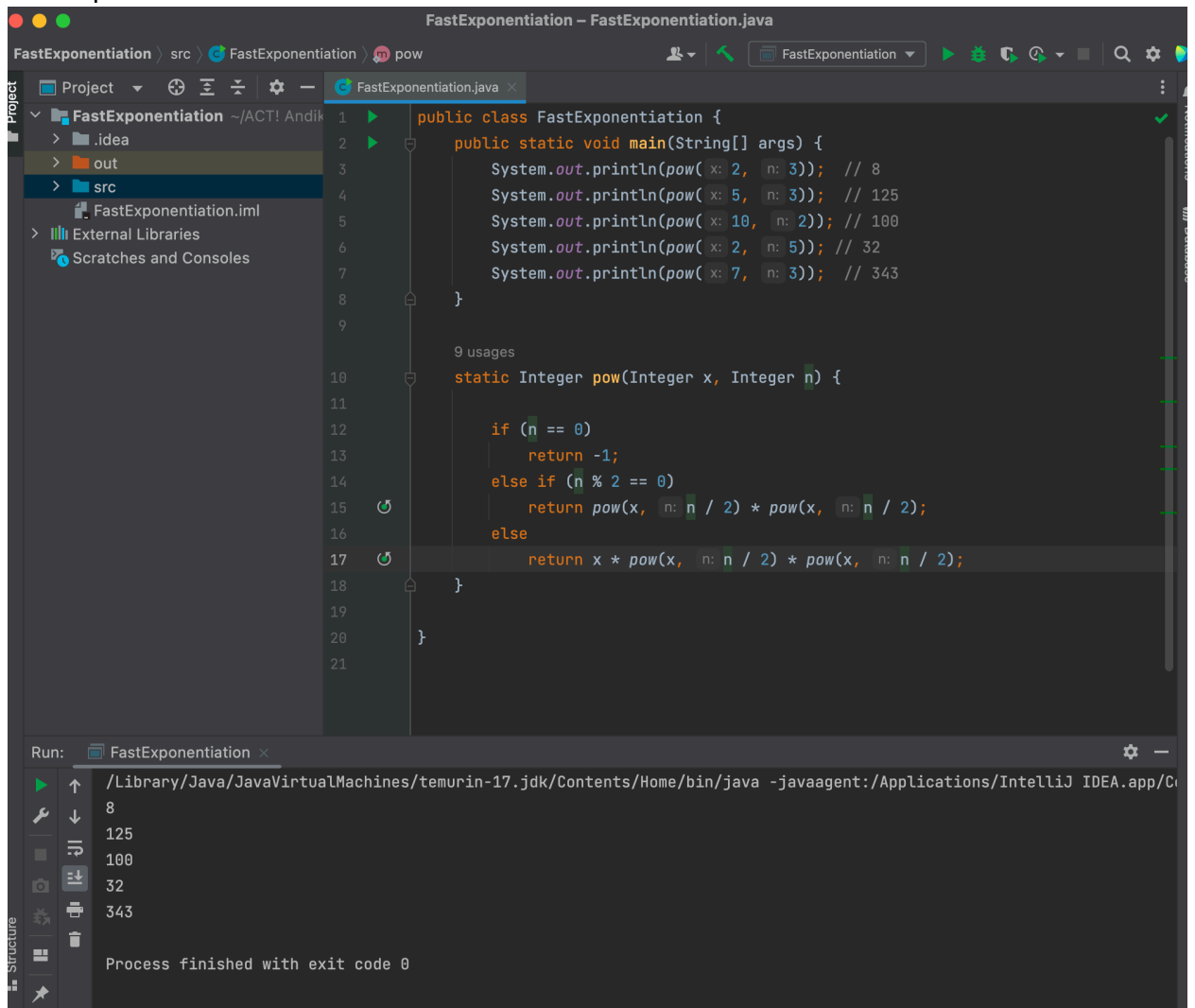
```
public class CheckPrime {  
    public static void main(String[] args) {  
        System.out.println(primeNumber(1000000007));  
        System.out.println(primeNumber(13));  
        System.out.println(primeNumber(17));  
        System.out.println(primeNumber(20));  
        System.out.println(primeNumber(35));  
    }  
  
    static boolean primeNumber(Integer number) {  
        boolean isPrime = true;  
        for (int i = 2; i < Math.sqrt(number); i++) {  
            if (number % i == 0) {  
                isPrime = false;  
                break;  
            }  
        }  
        return isPrime;  
    }  
}
```

Run: CheckPrime x

/Library/Java/JavaVirtualMachines/temurin-17.jdk/Contents/Home/bin/java -javaagent:/Applications/IntelliJ IDEA.app/C...
true
true
true
false
false

Process finished with exit code 0

2. Fast Exponentiation



The screenshot displays the IntelliJ IDEA IDE with the `FastExponentiation.java` file open. The code implements a fast exponentiation algorithm using recursion. The `main` method calls `pow` with various inputs, and the `pow` method uses a divide-and-conquer strategy to calculate powers efficiently.

```
1 public class FastExponentiation {
2     public static void main(String[] args) {
3         System.out.println(pow(2, 3)); // 8
4         System.out.println(pow(5, 3)); // 125
5         System.out.println(pow(10, 2)); // 100
6         System.out.println(pow(2, 5)); // 32
7         System.out.println(pow(7, 3)); // 343
8     }
9
10    9 usages
11    static Integer pow(Integer x, Integer n) {
12        if (n == 0)
13            return -1;
14        else if (n % 2 == 0)
15            return pow(x, n / 2) * pow(x, n / 2);
16        else
17            return x * pow(x, n / 2) * pow(x, n / 2);
18    }
19
20 }
21
```

The Run window at the bottom shows the execution output:

```
Run: FastExponentiation x
/Library/Java/JavaVirtualMachines/temurin-17.jdk/Contents/Home/bin/java -javaagent:/Applications/IntelliJ IDEA.app/C...
8
125
100
32
343
Process finished with exit code 0
```