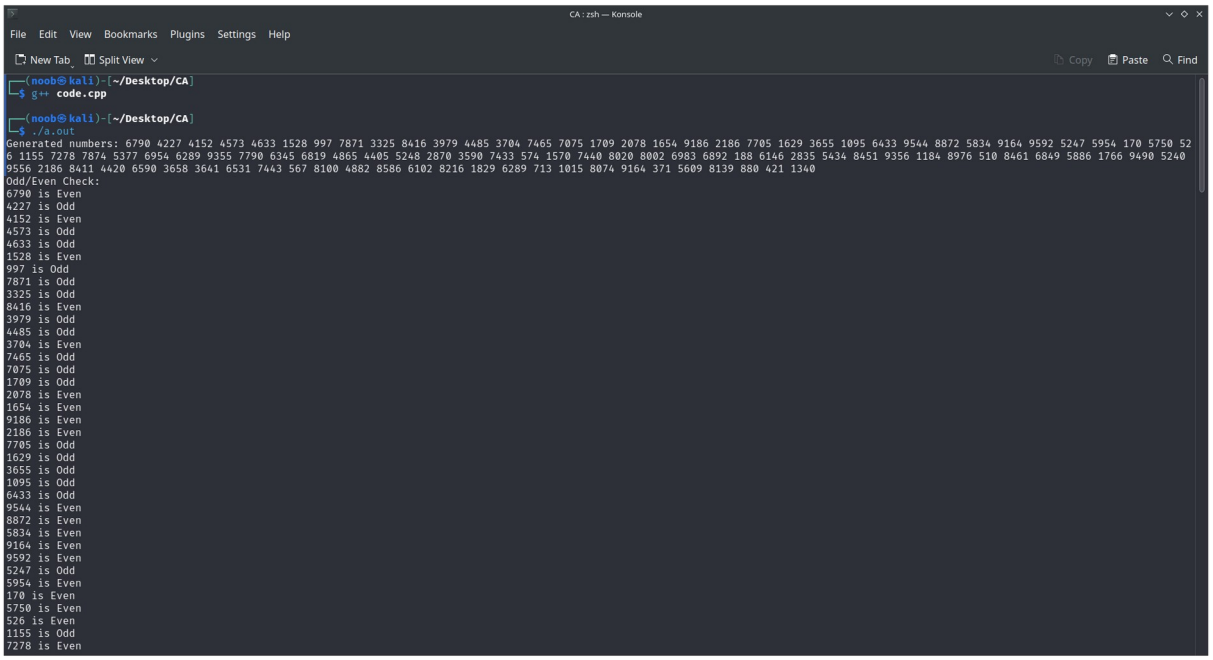
# CODE AND OUTPUT

NAME – ABHISHEK VITHAL KARATAGI
PRN – 22610034

```
#include <iostream>
#include <vector>
#include <cstdlib>
#include <ctime>
#include <cmath>

void generateRandomNumbers(std::vector<int>& arr);
bool isEven(int num);
bool isPrime(int num);
long long factorial(int num);
std::vector<int> prefixSum(const std::vector<int>& arr);
double computeAverage(const std::vector<int>& arr);

int main() {
    std::srand(std::time(0));

    std::vector<int> arr(100);
    generateRandomNumbers(arr);

    std::cout << "Generated numbers: ";
    for (int num : arr) {
        std::cout << num << " ";
    }
    std::cout << "\n";

    std::cout << "Odd/Even Check:\n";
    for (int num : arr) {
        std::cout << num << " is " << (isEven(num) ? "Even" : "Odd") << "\n";
    }

    std::cout << "Prime Check:\n";
    for (int num : arr) {
        std::cout << num << " is " << (isPrime(num) ? "Prime" : "Not Prime") << "\n";
    }

    std::cout << "Factorial Calculation (for first 10 numbers):\n";
    for (int i = 0; i < 10; ++i) {
        std::cout << "Factorial of " << arr[i] << " is " << factorial(arr[i]) << "\n";
    }

    std::vector<int> prefixSums = prefixSum(arr);
    std::cout << "Prefix Sum:\n";
    for (int sum : prefixSums) {
        std::cout << sum << " ";
    }
    std::cout << "\n";
```

```
    double avg = computeAverage(arr);
    std::cout << "Average of the numbers is: " << avg << "\n";

    return 0;
}

void generateRandomNumbers(std::vector<int>& arr) {
    for (int &num : arr) {
        num = std::rand() % 10000 + 1;
    }
}

bool isEven(int num) {
    return num % 2 == 0;
}

bool isPrime(int num) {
    if (num <= 1) return false;
    if (num <= 3) return true;
    if (num % 2 == 0 || num % 3 == 0) return false;
    for (int i = 5; i <= std::sqrt(num); i += 6) {
        if (num % i == 0 || num % (i + 2) == 0) return false;
    }
    return true;
}

long long factorial(int num) {
    if (num == 0 || num == 1) return 1;
    return num * factorial(num - 1);
}

std::vector<int> prefixSum(const std::vector<int>& arr) {
    std::vector<int> prefixSums(arr.size());
    prefixSums[0] = arr[0];
    for (size_t i = 1; i < arr.size(); ++i) {
        prefixSums[i] = prefixSums[i - 1] + arr[i];
    }
    return prefixSums;
}

double computeAverage(const std::vector<int>& arr) {
    int sum = 0;
    for (int num : arr) {
        sum += num;
    }
    return static_cast<double>(sum) / arr.size();
}
```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(noob㉿kali)-[~/Desktop/CA]
$ g++ code.cpp
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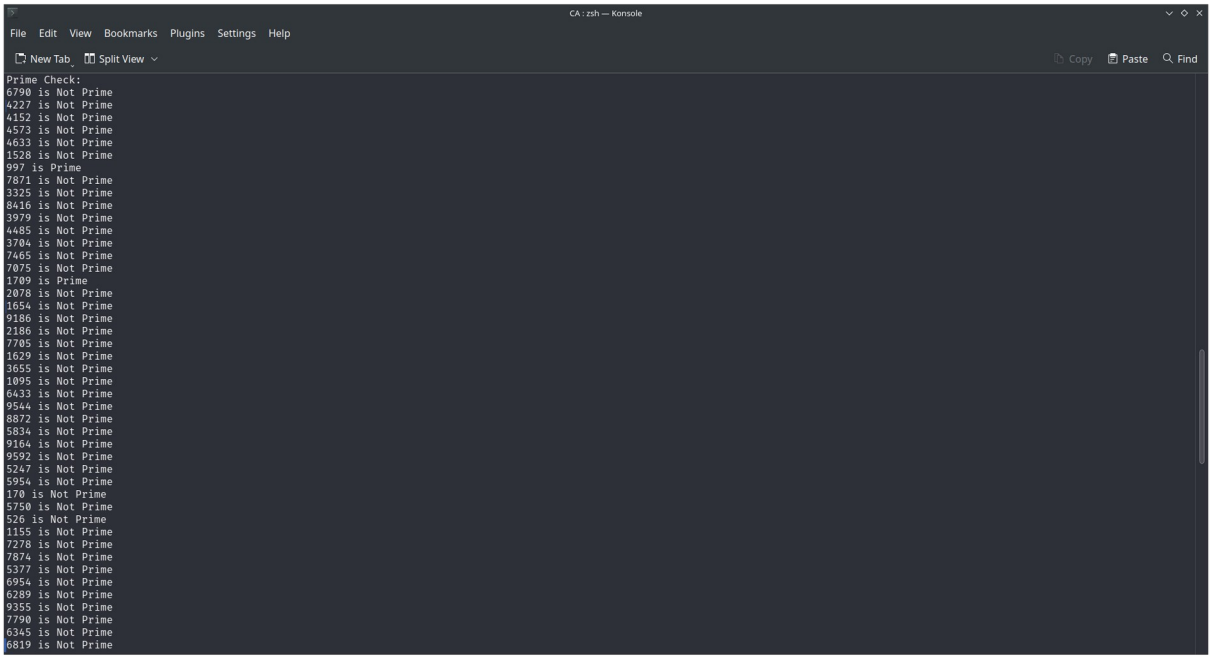
$ ./a.out
Generated numbers: 6790 4227 4152 4573 4633 1528 997 7871 3325 8416 3979 4485 3704 7465 7075 1709 2078 1654 9186 2186 7705 1629 3655 1095 6433 9544 8872 5834 9164 9592 5247 5954 170 5750 526 1155 7278 7874 5377 6954 6289 9355 7790 6345 6819 4865 4405 5248 2870 3590 7433 574 1570 7440 8020 8002 6983 6892 188 6146 2835 5434 8451 9356 1184 8976 510 8461 6849 5886 1766 9490 5240 9556 2186 8411 4420 6590 3658 3641 6531 7443 567 8100 4882 8586 6102 8216 1829 6289 713 1015 8074 9164 371 5609 8139 880 421 1340
Odd/Even Check:
6790 is Even
4227 is Odd
4152 is Even
4573 is Odd
4633 is Odd
1528 is Even
997 is Odd
7871 is Odd
3325 is Odd
8416 is Even
3979 is Odd
4485 is Odd
3704 is Even
7465 is Odd
7075 is Odd
1709 is Odd
2078 is Even
1654 is Even
9186 is Even
2186 is Even
7705 is Odd
1629 is Odd
3655 is Odd
1095 is Odd
6433 is Odd
9544 is Even
8872 is Even
5834 is Even
9164 is Even
9592 is Even
5247 is Odd
5954 is Even
170 is Even
5750 is Even
526 is Even
1155 is Odd
7278 is Even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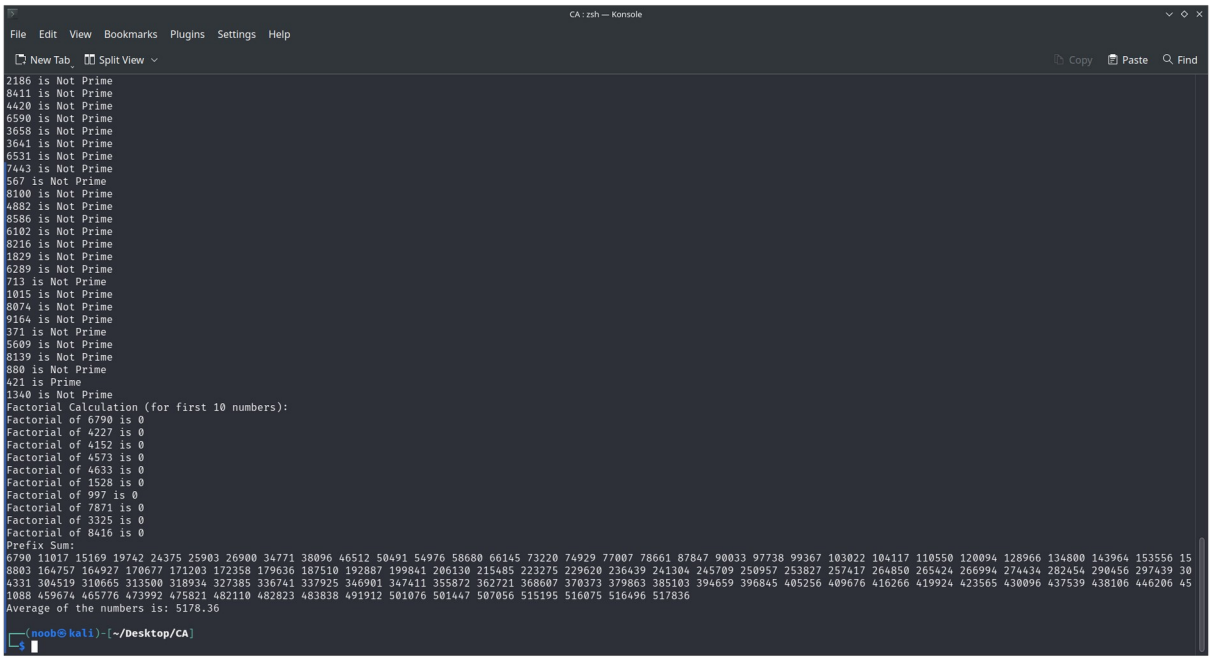
Prime Check:
6790 is Not Prime
4227 is Not Prime
4152 is Not Prime
4573 is Not Prime
4633 is Not Prime
1528 is Not Prime
997 is Prime
7871 is Not Prime
3325 is Not Prime
8416 is Not Prime
3979 is Not Prime
4485 is Not Prime
3704 is Not Prime
7465 is Not Prime
7075 is Not Prime
1709 is Prime
2078 is Not Prime
1654 is Not Prime
9186 is Not Prime
2186 is Not Prime
7705 is Not Prime
1629 is Not Prime
3655 is Not Prime
1095 is Not Prime
6433 is Not Prime
9544 is Not Prime
8872 is Not Prime
5834 is Not Prime
9164 is Not Prime
9592 is Not Prime
5247 is Not Prime
5954 is Not Prime
170 is Not Prime
5750 is Not Prime
526 is Not Prime
1155 is Not Prime
7278 is Not Prime
7874 is Not Prime
5377 is Not Prime
6954 is Not Prime
6289 is Not Prime
9355 is Not Prime
7790 is Not Prime
6345 is Not Prime
6819 is Not Prime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2186 is Not Prime
8411 is Not Prime
4420 is Not Prime
6590 is Not Prime
3658 is Not Prime
3641 is Not Prime
6531 is Not Prime
7443 is Not Prime
567 is Not Prime
8100 is Not Prime
4882 is Not Prime
8586 is Not Prime
6102 is Not Prime
8216 is Not Prime
1829 is Not Prime
6289 is Not Prime
713 is Not Prime
1015 is Not Prime
8074 is Not Prime
9164 is Not Prime
371 is Not Prime
5609 is Not Prime
8139 is Not Prime
880 is Not Prime
421 is Prime
1340 is Not Prime
Factorial Calculation (for first 10 numbers):
Factorial of 6790 is 0
Factorial of 4227 is 0
Factorial of 4152 is 0
Factorial of 4573 is 0
Factorial of 4633 is 0
Factorial of 1528 is 0
Factorial of 997 is 0
Factorial of 7871 is 0
Factorial of 3325 is 0
Factorial of 8416 is 0
Prefix Sum:
6790 11017 15169 19742 24375 25903 26900 34771 38096 46512 50491 54976 58680 66145 73220 74929 77007 78661 87847 90033 97738 99367 103022 104117 110550 120094 128966 134800 143964 153556 15
8803 164757 164927 170677 171203 172358 179636 187510 192887 199841 206130 215485 223275 229620 236439 241304 245709 250957 253827 257417 264850 265424 266994 274434 282454 290456 297439 30
4331 304519 310665 313500 318934 327385 336741 337925 346901 347411 355872 362721 368607 370373 379863 385103 394659 396845 405256 409676 416266 419924 423565 430096 437539 438106 446206 45
1088 459674 465776 473992 475821 482110 482823 483838 491912 501076 501447 507056 515195 516075 516496 517836
Average of the numbers is: 5178.36
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