1)Pdf file with array generated,code,output

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//Code

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

using namespace std;

// Function prototypes
vector<int> generateRandomArray(int size, int min, int max);
bool isEven(int num);
bool isPrime(int num);
long long factorial(int num);
vector<int> prefixSum(const vector<int>& array);
double calculateAverage(const vector<int>& array);

// Function implementations
vector<int> generateRandomArray(int size, int min, int max) {
    vector<int> array(size);
    srand(static_cast<unsigned int>(time(0)));
    for (int i = 0; i < size; ++i) {
        array[i] = rand() % (max - min + 1) + min;
    }
    return array;
}

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

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

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

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

double calculateAverage(const vector<int>& array) {
    int sum = 0;
    for (int num : array) {
        sum += num;
    }
    return static_cast<double>(sum) / array.size();
}

void printArray(const vector<int>& array) {
    for (int num : array) {
```

```
        cout << num << " ";
    }
    cout << endl;
}

void processArray(const vector<int>& array) {
    for (int num : array) {
        cout << "Number: " << num;
        cout << ", Even: " << (isEven(num) ? "Yes" : "No");
        cout << ", Prime: " << (isPrime(num) ? "Yes" : "No");
        cout << ", Factorial: " << factorial(num);
        cout << endl;
    }
}

int main() {
    const int size = 100;
    const int min = 1;
    const int max = 10000;

    vector<int> array = generateRandomArray(size, min, max);

    cout << "Generated array: " << endl;
    printArray(array);

    processArray(array);

    vector<int> prefix = prefixSum(array);
    cout << "Prefix sum array: " << endl;
    printArray(prefix);

    double average = calculateAverage(array);
    cout << "Average: " << average << endl;

    return 0;
```

}

//array output and code

```
Generated array:
3978 8639 8162 3130 7636 2870 5298 9663 5341 6145 4842 9557 3073 5410 5059 1335 3645 9916 8107 294 36 6209 4783 9000 329 1327 2380 2312 3084 2484 302 7062 112
2 4815 6543 8758 7684 8192 4772 9376 4336 9613 5285 7408 1375 6695 5094 5019 6611 3201 1664 2998 9409 2798 1997 9738 4124 728 8401 7208 3212 8702 621 4333 986
9 7163 9442 7552 5354 4213 3280 9690 178 8564 3449 1552 1610 8543 2922 4572 1743 4586 7569 7503 7383 9565 3592 7859 293 1992 1418 3504 7046 2038 4188 6914 555
2 3630 817 905
Number: 3978, Even: Yes, Prime: No, Factorial: 0
Number: 8639, Even: No, Prime: No, Factorial: 0
Number: 8162, Even: Yes, Prime: No, Factorial: 0
Number: 3130, Even: Yes, Prime: No, Factorial: 0
Number: 7636, Even: Yes, Prime: No, Factorial: 0
Number: 2870, Even: Yes, Prime: No, Factorial: 0
Number: 5298, Even: Yes, Prime: No, Factorial: 0
Number: 9663, Even: No, Prime: No, Factorial: 0
Number: 5341, Even: No, Prime: No, Factorial: 0
Number: 6145, Even: No, Prime: No, Factorial: 0
Number: 4842, Even: Yes, Prime: No, Factorial: 0
Number: 9557, Even: No, Prime: No, Factorial: 0
Number: 3073, Even: No, Prime: No, Factorial: 0
Number: 5410, Even: Yes, Prime: No, Factorial: 0
Number: 5059, Even: No, Prime: Yes, Factorial: 0
Number: 1335, Even: No, Prime: No, Factorial: 0
Number: 3645, Even: No, Prime: No, Factorial: 0
Number: 9916, Even: Yes, Prime: No, Factorial: 0
Number: 8107, Even: No, Prime: No, Factorial: 0
Number: 294, Even: Yes, Prime: No, Factorial: 0
Number: 36, Even: Yes, Prime: No, Factorial: 9003737871877668864
Number: 6209, Even: No, Prime: No, Factorial: 0
Number: 4783, Even: No, Prime: Yes, Factorial: 0
Number: 9000, Even: Yes, Prime: No, Factorial: 0
Number: 329, Even: No, Prime: No, Factorial: 0
Number: 1327, Even: No, Prime: Yes, Factorial: 0
Number: 2380, Even: Yes, Prime: No, Factorial: 0
Number: 2312, Even: Yes, Prime: No, Factorial: 0
Number: 3084, Even: Yes, Prime: No, Factorial: 0
Number: 2484, Even: Yes, Prime: No, Factorial: 0
Number: 302, Even: Yes, Prime: No, Factorial: 0
```

```
Number: 2484, Even: Yes, Prime: No, Factorial: 0
Number: 302, Even: Yes, Prime: No, Factorial: 0
Number: 7062, Even: Yes, Prime: No, Factorial: 0
Number: 1122, Even: Yes, Prime: No, Factorial: 0
Number: 4815, Even: No, Prime: No, Factorial: 0
Number: 6543, Even: No, Prime: No, Factorial: 0
Number: 8758, Even: Yes, Prime: No, Factorial: 0
Number: 7684, Even: Yes, Prime: No, Factorial: 0
Number: 8192, Even: Yes, Prime: No, Factorial: 0
Number: 4772, Even: Yes, Prime: No, Factorial: 0
Number: 9376, Even: Yes, Prime: No, Factorial: 0
Number: 4336, Even: Yes, Prime: No, Factorial: 0
Number: 9613, Even: No, Prime: Yes, Factorial: 0
Number: 5285, Even: No, Prime: No, Factorial: 0
Number: 7408, Even: Yes, Prime: No, Factorial: 0
Number: 1375, Even: No, Prime: No, Factorial: 0
Number: 6695, Even: No, Prime: No, Factorial: 0
Number: 5094, Even: Yes, Prime: No, Factorial: 0
Number: 5019, Even: No, Prime: No, Factorial: 0
Number: 6611, Even: No, Prime: No, Factorial: 0
Number: 3201, Even: No, Prime: No, Factorial: 0
Number: 1664, Even: Yes, Prime: No, Factorial: 0
Number: 2998, Even: Yes, Prime: No, Factorial: 0
Number: 9409, Even: No, Prime: No, Factorial: 0
Number: 2798, Even: Yes, Prime: No, Factorial: 0
Number: 1997, Even: No, Prime: Yes, Factorial: 0
Number: 9738, Even: Yes, Prime: No, Factorial: 0
Number: 4124, Even: Yes, Prime: No, Factorial: 0
Number: 728, Even: Yes, Prime: No, Factorial: 0
Number: 8401, Even: No, Prime: No, Factorial: 0
Number: 7208, Even: Yes, Prime: No, Factorial: 0
Number: 3212, Even: Yes, Prime: No, Factorial: 0
Number: 8702, Even: Yes, Prime: No, Factorial: 0
Number: 621, Even: No, Prime: No, Factorial: 0
Number: 4333, Even: No, Prime: No, Factorial: 0
```

```
Number: 8564, Even: Yes, Prime: No, Factorial: 0
Number: 3449, Even: No, Prime: Yes, Factorial: 0
Number: 1552, Even: Yes, Prime: No, Factorial: 0
Number: 1610, Even: Yes, Prime: No, Factorial: 0
Number: 8543, Even: No, Prime: Yes, Factorial: 0
Number: 2922, Even: Yes, Prime: No, Factorial: 0
Number: 4572, Even: Yes, Prime: No, Factorial: 0
Number: 1743, Even: No, Prime: No, Factorial: 0
Number: 4586, Even: Yes, Prime: No, Factorial: 0
Number: 7569, Even: No, Prime: No, Factorial: 0
Number: 7503, Even: No, Prime: No, Factorial: 0
Number: 7383, Even: No, Prime: No, Factorial: 0
Number: 9565, Even: No, Prime: No, Factorial: 0
Number: 3592, Even: Yes, Prime: No, Factorial: 0
Number: 7859, Even: No, Prime: No, Factorial: 0
Number: 293, Even: No, Prime: Yes, Factorial: 0
Number: 1992, Even: Yes, Prime: No, Factorial: 0
Number: 1418, Even: Yes, Prime: No, Factorial: 0
Number: 3504, Even: Yes, Prime: No, Factorial: 0
Number: 7046, Even: Yes, Prime: No, Factorial: 0
Number: 2038, Even: Yes, Prime: No, Factorial: 0
Number: 4188, Even: Yes, Prime: No, Factorial: 0
Number: 6914, Even: Yes, Prime: No, Factorial: 0
Number: 5552, Even: Yes, Prime: No, Factorial: 0
Number: 3630, Even: Yes, Prime: No, Factorial: 0
Number: 817, Even: No, Prime: No, Factorial: 0
Number: 905, Even: No, Prime: No, Factorial: 0
Prefix sum array:
3978 12617 20779 23909 31545 34415 39713 49376 54717 60862 65704 75261 78334 83744 88803 90138 93783 103699 111806 112100 112136 118345 123128 132128 132457 1
33784 136164 138476 141560 144044 144346 151408 152530 157345 163888 172646 180330 188522 193294 202670 207006 216619 221904 229312 230687 237382 242476 24749
5 254106 257307 258971 261969 271378 274176 276173 285911 290035 290763 299164 306372 309584 318286 318907 323240 333109 340272 349714 357266 362620 366833 37
0113 379803 379981 388545 391994 393546 395156 403699 406621 411193 412936 417522 425091 432594 439977 449542 453134 460993 461286 463278 464696 468200 475246
 477284 481472 488386 493938 497568 498385 499290
Average: 4992.9
```