GOVERNMENT GRADUATE COLLEGE BUREWALA

NAME\_\_HUSNAIN KHAN\_\_\_\_\_\_\_\_\_\_: CLASS\_\_\_\_BSCS\_\_(SEM 1ST)\_\_\_\_\_\_

ROLL NO #\_\_\_\_\_47\_\_\_\_\_\_\_\_\_\_\_\_\_\_: HOD\_\_\_PRO.RANA NADEEM SHAB\_\_\_

SUBJECT\_\_\_\_FUNDAMENTAL\_PROGRAMMING\_\_\_\_(C++)

ASSIGNMENT NO 4

**Program 1: Display pattern using while loop**

#include <iostream>

#include <cmath>

using namespace std;

Int main()

{

int a = 1, b = 5;

cout << "a\tb\n";

while (a <= 5)

{

cout << a << "\t" << b << "\n";

a++;

b--;

}

return 0;

}

**Program 2: Display sum pattern using while loop**

#include <iostream>

#include <cmath>

using namespace std;

Int main(){

int num = 1, sum = 0;

cout << "num<<\t<<sum<<\n";

while (num <= 5) {

sum += num;

cout << num << "\t" << sum << "\n";

num++;

}

return 0;

}

**Program 3: Sum of series 1 + 1/4 + 1/8 + ... + 1/100 using do-while**

#include <iostream>

#include <cmath>

using namespace std;

Int main()

{

double sum = 1.0;

int i = 4;

do {

sum += 1.0 / i;

i \*= 2;

} while (i <= 100);

cout << "Sum of series: " << sum << endl;

}return 0;

}

**Program 4: Display alphabets from A to Z using for loop**

#include <iostream>

using namespace std;

Int main(){

for (char ch = 'A'; ch <= 'Z'; ch++)

{

cout << ch << " ";

}

cout << endl;

}return 0;

}

**Program 5: Find largest, smallest, and average of n numbers**

#include <iostream>

using namespace std;

Int main(){

int n, num, maxNum, minNum, sum = 0;

cout << "Enter the number of values: ";

cin >> n;

for (int i = 0; i < n; i++) {

cin >> num;

if (i == 0) {

maxNum = minNum = num;

} else {

if (num > maxNum) maxNum = num;

if (num < minNum) minNum = num;

}

sum += num;

}

cout << "Max: " << maxNum << " Min: " << minNum << " Avg: " << (sum / (double)n) << endl;

}return 0;

}

**Program 6: Ask a question 20 times and count answers**

#include <iostream>

using namespace std;

Int main(){

int answers[4] = {0};

int choice;

for (int i = 0; i < 20; i++) {

cout << "Enter your answer (1-4): ";

cin >> choice;

if (choice >= 1 && choice <= 4) {

answers[choice - 1]++;

}

}

for (int i = 0; i < 4; i++) {

cout << "Answer " << (i + 1) << " was chosen " << answers[i] << " times.\n";

}return 0;

}

**Program 7: Find minimum of 20 numbers**

#include <iostream>

using namespace std;

Int main(){

int num, minNum;

cin >> minNum;

for (int i = 1; i < 20; i++) {

cin >> num;

if (num < minNum) minNum = num;

}

cout << "Minimum value: " << minNum << endl;

}return 0;

}

**Program 8: Fibonacci series up to n**

#include <iostream>

using namespace std;

Int main(){

int a = 0, b = 1, next;

while (a <= n) {

cout << a << " ";

next = a + b;

a = b;

b = next;

}

cout << endl;

}return 0;

}

**Program 9: Armstrong numbers up to n**

#include <iostream>

using namespace std;

Int main(){

for (int num = 1; num <= n; num++) {

int sum = 0, temp = num, digits = log10(num) + 1;

while (temp) {

sum += pow(temp % 10, digits);

temp /= 10;

}

if (sum == num) cout << num << " ";

}

cout << endl;

}return 0;

}

**Program 10: Perfect numbers up to n**

#include <iostream>

using namespace std;

Int main() {

for (int num = 1; num <= n; num++) {

int sum = 0;

for (int i = 1; i < num; i++) {

if (num % i == 0) sum += i;

}

if (sum == num) cout << num << " ";

}

cout << endl;

}return 0;

}

**Program 11: Find highest and second highest marks**

#include <iostream>

using namespace std;

Int main(){

int n, mark, highest = 0, secondHighest = 0;

cin >> n;

for (int i = 0; i < n; i++) {

cin >> mark;

if (mark > highest) {

secondHighest = highest;

highest = mark;

} else if (mark > secondHighest) secondHighest = mark;

}

cout << "Highest: " << highest << " Second Highest: " << secondHighest << endl;

}return 0;

}

**Program 12: Average of numbers until 9999**

#include <iostream>

using namespace std;

Int main(){

int num, count = 0, sum = 0;

while (cin >> num && num != 9999) {

sum += num;

count++;

}

cout << "Average: " << (sum / (double)count) << endl;

}return 0;

}

**Program 13: Prime numbers less than n**

#include <iostream>

using namespace std;

Int main() {

for (int i = 2; i < n; i++) {

bool prime = true;

for (int j = 2; j \* j <= i; j++) {

if (i % j == 0) {

prime = false;

break;

}

}

if (prime) cout << i << " ";

}

cout << endl;

}return 0;

}

**program 14: Factorial calculation loop**

#include <iostream>

using namespace std;

Int main(){

int num;

while (true) {

cin >> num;

if (num == 0) break;

int fact = 1;

for (int i = 2; i <= num; i++) fact \*= i;

cout << "Factorial: " << fact << endl;

}

}return 0;

}

**Program 15: Check if a number is prime**

#include <iostream>

using namespace std;

Int main() {

if (n <= 1) return false;

for (int i = 2; i <= sqrt(n); i++) {

if (n % i == 0) return false;

}

Return 0;

}

**Program 16: Find the second largest number**

#include <iostream>

using namespace std;

Int main(){

int num, largest = 0, secondLargest = 0;

while (true) {

cin >> num;

if (num == 0) break;

if (num > largest) {

secondLargest = largest;

largest = num;

} else if (num > secondLargest) {

secondLargest = num;

}

}

cout << "Second Largest: " << secondLargest << endl;

}return 0;

}

**Program 17: Count positive and negative numbers**

#include <iostream>

using namespace std;

Int main(){

int n, num, posCount = 0, negCount = 0;

cin >> n;

for (int i = 0; i < n; i++) {

cin >> num;

if (num > 0) posCount++;

else if (num < 0) negCount++;

}

cout << "Positive: " << posCount << ", Negative: " << negCount << endl;

}return 0;

}

**Program 18: Sum of x^1 + x^2 + ... + x^n**

#include <iostream>

using namespace std;

Int main(){

int sum = 0;

for (int i = 1; i <= n; i++) {

sum += pow(x, i);

}

return 0;

}

**Program 19: Sum of 1 + 2x + 3x^2 + 4x^3 + 5x^4**

#include <iostream>

using namespace std;

Int main(){

int sum = 0;

for (int i = 1; i <= n; i++) {

sum += i \* pow(x, i - 1);

}

return 0;

}

**Program 20: Sum of 1/2 + 2/3 + 3/4 + ... + 99/100**

#include <iostream>

using namespace std;

Int main(){

double sum = 0;

for (int i = 1; i < 100; i++) {

sum += (double)i / (i + 1);

}

return 0;

}

**Program 21: Print sequence 1024, 512, 256, ..., 1**

#include <iostream>

using namespace std;

Int main(){

for (int i = 1024; i >= 1; i /= 2) {

cout << i << " ";

}

cout << endl;

}return 0;

}

**Program 22: Print sequence 1, 3, 9, 27, ..., 200**

#include <iostream>

using namespace std;

int main(){

for (int i = 1; i <= 200; i \*= 3) {

cout << i << " ";

}

cout << endl;

}return 0;}

**Program 23: Print sequence 8, 12, 17, ..., 100**

#include <iostream>

using namespace std;

int main(){

for (int i = 8; i <= 100; i += (i - 6)) {

cout << i << " ";

}

cout << endl;

}return 0;

}

**Program 24: Sum of 1/1! + 2/2! + 3/3! + ...**

#include <iostream>

using namespace std;

Int main({

double sum = 0;

int fact = 1;

for (int i = 1; i <= 7; i++) {

fact \*= i;

sum += (double)i / fact;

}

return 0;

}

**Program 25: Sum of 30 + 33 + 36 + ... + 60**

#include <iostream>

using namespace std;

Int main(){

int sum = 0;

for (int i = 30; i <= 60; i += 3) {

sum += i;

}

return 0;

}

**Program 26: Sum of 1 + x^2/2! + x^3/3! + ...**

#include <iostream>

using namespace std;

Int main(){

double sum = 1;

int fact = 1;

for (int i = 1; i <= n; i++) {

fact \*= i;

sum += pow(x, i) / fact;

}

return 0;

}

**Program 27: Sum of 1 - x^2/2! + x^4/4! - ... n**

#include <iostream>

using namespace std;

#include <iostream>

using namespace std;

Int main(){

double sum = 1;

int fact = 1;

for (int i = 2; i <= n; i += 2) {

fact \*= i \* (i - 1);

sum += pow(x, i) / fact \* (i % 4 == 0 ? 1 : -1);

}

return 0;

}

**Program 28: Find factors of a number**

#include <iostream>

using namespace std;

Int main(){

for (int i = 1; i <= num; i++) {

if (num % i == 0) cout << i << " ";

}

cout << endl;

}return 0;

}

**Program 29: Sum specified number of values**

#include <iostream>

using namespace std;

Int main(){

int count, num, sum = 0;

cin >> count;

for (int i = 0; i < count; i++) {

cin >> num;

sum += num;

}

cout << "Sum: " << sum << endl;

}

Return 0;

}

**Program 30: Savings with compound interest**

#include <iostream>

using namespace std;

int main() {

double compoundInterest(double p, double r, int n)

cout << "Prime check: " << isPrime(7) << endl;

secondLargest();

countNumbers();

cout << "Sum power series: " << sumPowerSeries(2, 4) << endl;

cout << "Sum modified series: " << sumModifiedSeries(2, 4) << endl;

cout << "Sum fraction series: " << sumFractionSeries() << endl;

printSequence1();

printSequence2();

printSequence3();

cout << "Sum factorial series: " << sumFactorialSeries() << endl;

cout << "Sum arithmetic series: " << sumArithmeticSeries() << endl;

cout << "Sum exponential series: " << sumExponentialSeries(2, 4) << endl;

cout << "Sum alternating series: " << sumAlternatingSeries(2, 4) << endl;

findFactors(28);

sumSpecifiedValues();

cout << "Compound Interest: " << compoundInterest(1000, 0.05, 10) << endl;

    return 0;

}

**31. Sum of first n odd integers**

#include <iostream>

using namespace std;

Int main() {

int sum = 0;

for (int i = 1, count = 0; count < n; i += 2, count++) {

sum += i;

}

return 0;

}

**32. Multiples of a given number between two numbers**

#include <iostream>

using namespace std;

Int main(){

for (int i = start; i <= end; i++) {

if (i % num == 0) {

cout << i << " ";

}

}

cout << endl;

}return 0;}

**33. Count digits in a number**

#include <iostream>

using namespace std;

Int main(){ int count = 0;

while (num > 0) {

count++;

num /= 10;

}

return count;

}

**34. Find GCD of three numbers**

#include <iostream>

using namespace std;

Int main(){

while (b != 0) {

int temp = b;

b = a % b;

a = temp;

}

return a;

}

**35. Check if a number is odd/even and prime**

#include <iostream>

using namespace std;

void checkNumbers() {

int num, totalOdd = 0, totalEven = 0, totalPrime = 0;

while (true) {

cout << "Enter a number (-1 to stop): ";

cin >> num;

if (num == -1) break;

if (num % 2 == 0) totalEven++;

else totalOdd++;

if (isPrime(num)) totalPrime++;

}

cout << "Total Odd: " << totalOdd << "\nTotal Even: " << totalEven << "\nTotal Prime: " << totalPrime << endl;

}

}

cout << "Total Odd: " << totalOdd << "\nTotal Even: " << totalEven << "\nTotal Prime: " << totalPrime << endl;

}return 0;}

**36. Sum of every third integer up to 100**

#include <iostream>

using namespace std;

Int main() {

int sum = 0;

for (int i = 2; i < 100; i += 3) {

sum += i;

}

return sum;

}

**37. Sum of factorial series**

#include <iostream>

using namespace std;

Int main(){

int fact = 1;

for (int i = 1; i <= n; i++) {

fact \*= i;

double sumFactorialSeries(int terms) {

double sum = 0;

for (int i = 1; i <= terms; i++) {

sum += (double)i / factorial(i + 1);

}

return sum;

}

**38. Sum of given series**

#include <iostream>

using namespace std;

Int main() {

double sum = 0;

for (int i = 1; i <= terms; i++) {

sum += (double)i / (2 \* i + 1);

}

return sum;

}

**39. Generate all possible combinations of 1, 2, 3, and 4**

#include <iostream>

using namespace std;

Int main(){

for (int i = 1; i <= 4; i++) {

for (int j = 1; j <= 4; j++) {

for (int k = 1; k <= 4; k++) {

cout << i << j << k << " ";

}

}

}

cout << endl;

}

40. Prime numbers ending with 7 in descending order

Int main()) {

for (int i = end; i >= start; i--) {

if (i % 10 == 7 && isPrime(i)) {

cout << i << " ";

}

}

cout << endl;

}return 0;}

**41. Prime palindromes between 100 and 500**

#include <iostream>

using namespace std;

Int main(){

int rev = 0, temp = num;

while (temp > 0) {

rev = rev \* 10 + temp % 10;

temp /= 10;

}

return rev == num;

}

void primePalindromes() {

for (int i = 100; i <= 500; i++) {

if (isPrime(i) && isPalindrome(i)) {

cout << i << " ";

}

}

cout << endl;

}return 0;}

**42. LCM of three numbers**

#include <iostream>

using namespace std;

int lcm(int a, int b) {

return (a \* b) / gcd(a, b);

}

int lcmThree(int a, int b, int c) {

return lcm(lcm(a, b), c);

}

**43. Written the sum of number**

#include <iostream>

using namespace std;

int main() {

cout << "Sum of first 5 odd numbers: " << sumOdd(5) << endl;

printMultiples(3, 10, 30);

cout << "Digits in 12345: " << countDigits(12345) << endl;

cout << "GCD of 18, 24, and 30: " << gcdThree(18, 24, 30) << endl;

checkNumbers();

cout << "Sum of every third number < 100: " << sumEveryThird() << endl;

cout << "Factorial series sum: " << sumFactorialSeries(9) << endl;

cout << "Series sum: " << sumSeries(10) << endl;

generateCombinations();

primesEndingWith7(10, 100);

primePalindromes();

cout << "LCM of 12, 15, 20: " << lcmThree(12, 15, 20) << endl;

    return 0;

}

int main() {

cout << "Sum of first 5 odd numbers: " << sumOdd(5) << endl;

printMultiples(3, 10, 30);

cout << "Digits in 12345: " << countDigits(12345) << endl;

cout << "GCD of 18, 24, and 30: " << gcdThree(18, 24, 30) << endl;

checkNumbers();

cout << "Sum of every third number < 100: " << sumEveryThird() << endl;

cout << "Factorial series sum: " << sumFactorialSeries(9) << endl;

cout << "Series sum: " << sumSeries(10) << endl;

generateCombinations();

primesEndingWith7(10, 100);

primePalindromes();

cout << "LCM of 12, 15, 20: " << lcmThree(12, 15, 20) << endl;

    return 0;

}

#include <iostream>

using namespace std;

int main() {

int i, j;

// Q48: Hollow Square

int size = 5;

for (i = 0; i < size; i++) {

for (j = 0; j < size; j++)

cout << ((i == 0 || i == size - 1 || j == 0 || j == size - 1) ? "\* " : " ");

cout << endl;

}

cout << "\n";

**// Q49: Right-Angled Triangle**

for (i = 1; i <= 5; i++) {

for (j = 1; j <= i; j++) cout << j << " ";

cout << endl;

}

cout << "\n";

**// Q50: Inverted Number Triangle**

for (i = 5; i >= 1; i--) {

for (j = 1; j <= i; j++) cout << j << " ";

cout << endl;

}

cout << "\n";

return 0;

}

**// Q51: Right-Angled Triangle (Reverse Row-wise)**

#include <iostream>

using namespace std;

int main() {

int i, j, n;

// **Q55: Solid Square of Hashes**

#include <iostream>

using namespace std;

for (i = 0; i < 7; i++) {

for (j = 0; j < 7; j++) cout << "# ";

cout << endl;

}

cout << "\n";

return 0;

}

**// Q56: Right-Aligned Decreasing 'B' Pattern**

#include <iostream>

using namespace std;

int main()

for (i = 10; i >= 1; i -= 2) {

for (j = 0; j < (10 - i) / 2; j++) cout << ". ";

for (j = 0; j < i; j++) cout << "B";

cout << endl;

}

cout << "\n";

return 0;}

**// Q57: Reverse Triangle of '&'**

#include <iostream>

using namespace std;

int main()

cout << "Enter height: ";

cin >> n;

for (i = n; i >= 1; i--) {

for (j = 0; j < n - i; j++) cout << " ";

for (j = 0; j < (2 \* i - 1); j++) cout << "& ";

cout << endl;

}

cout << "\n";

return 0;

}

**// Q58: Diamond of Asterisks**

#include <iostream>

using namespace std;

int main()

for (i = 1; i <= 5; i++) {

for (j = 5; j > i; j--) cout << " ";

for (j = 0; j < (2 \* i - 1); j++) cout << "\*";

cout << endl;

}

for (i = 4; i >= 1; i--) {

for (j = 5; j > i; j--) cout << " ";

for (j = 0; j < (2 \* i - 1); j++) cout << "\*";

cout << endl;

}

cout << "\n";

return 0:}

**// Q59: Pyramid of Digits**

#include <iostream>

using namespace std;

int main()

for (i = 1; i <= 10; i++) {

for (j = i; j < 10; j++) cout << " ";

for (j = i; j <= 2 \* i - 1; j++) cout << j % 10;

for (j = 2 \* i - 2; j >= i; j--) cout << j % 10;

cout << endl;

}

    return 0;

}

**Q.60**: **Triangle of Alphabets**

#include <iostream>

using namespace std;

int main() {

int i, j, n, num = 1;

cout << "Enter height: ";

cin >> n;

for (i = 0; i < n; i++) {

for (j = 0; j <= i; j++) cout << char('A' + j) << " ";

cout << endl;

}

cout << "\n";

for (j = i - 1; j >= 1; j--) cout << j << " ";

cout << endl;

return 0;

}

**Q61: Triangle of Odd Numbers (Using While Loop)**

#include <iostream>

using namespace std;

int main() {

int i = 1;

while (i <= 7) {

j = 0;

while (j < i) cout << num << " ", num += 2, j++;

cout << endl;

i += 2;

}

cout << "\n";return 0;}

**Q62: Number Pyramid Pattern**

#include <iostream>

using namespace std;

int main() {

for (i = 7; i >= 1; i--) {

for (j = 1; j <= i; j++) cout << j << " ";

for (j = i - 1; j >= 1; j--) cout << j << " ";

cout << endl;

}

cout << "\n";return 0;}

**// Q63: Hollow Triangle of '&'**

#include <iostream>

using namespace std;

int main() {

for (i = 1; i <= 7; i++) {

for (j = 1; j <= i; j++)

cout << (j == 1 || j == i || i == 7 ? "& " : " ");

cout << endl;

}

cout << "\n";return 0;}

**Q64: Triangle of Digits (Starting from 0)**

#include <iostream>

using namespace std;

int main() {

for (i = 0; i <= 5; i++) {

for (j = 0; j <= i; j++) cout << j;

cout << endl;

}

cout << "\n";return0;}

**Q65: Checkerboard Pattern**

#include <iostream>

using namespace std;

int main() {

for (i = 0; i < 8; i++) {

for (j = 0; j < 8; j++) cout << ((i + j) % 2 == 0 ? ". " : " ");

cout << endl;

}

    return 0;

}

**Q66:**

#include <iostream>

using namespace std;

int main() {

int i, j, n;

Q66: Rotating Alphabet Pattern

cout << "Enter number of rows: ";

cin >> n;

for (i = 0; i < n; i++) {

for (j = 0; j < 6; j++)

cout << char('A' + (i + j) % 6);

cout << endl;

}

cout << "\n";

Q67: Diamond Number Pattern

cout << "Enter number of rows: ";

cin >> n;

for (i = 1; i <= n; i++) {

for (j = 1; j <= i; j++) cout << j << " ";

cout << j - 1 << endl;

}

for (i = n - 1; i >= 1; i--) {

for (j = 1; j <= i; j++) cout << j << " ";

cout << j - 1 << endl;

}

cout << "\n";

return 0;

}

cout << "Enter number: ";

cin >> n;

for (i = n; i >= 1; i--) {

for (j = 1; j <= 2; j++) cout << i << " ";

cout << endl;

}

cout << "\n";

**// Q70: Multiplication Pattern**

cout << "Enter number of rows: ";

cin >> n;

for (i = n; i >= 1; i--) {

for (j = 1; j <= i; j++) cout << j << (j < i ? "\*" : "");

cout << endl;

}

cout << "\n";

**Q71: Pyramid of Odd Numbers**

#include <iostream>

using namespace std;

int main() {

int arr[] = {1, 3, 5, 7};

for (i = 4; i > 0; i--) {

for (j = 0; j < i; j++) cout << arr[j] << " ";

cout << endl;

}

for (i = 2; i <= 4; i++) {

for (j = 0; j < i; j++) cout << arr[j] << " ";

cout << endl;

}

cout << "\n";return 0;}

**Q72: Power Sequence Pattern**

int power[] = {1, 4, 9, 16, 25, 36, 49, 64};

for (i = 0; i < 4; i++) {

for (j = 0; j <= i; j++) cout << power[j] << " ";

cout << endl;

}

    return 0;

}

**THE END**