



COMSATS University Islamabad, Vehari Campus

Department of Computer Science

Class: BCS-SP22-4B

Submission Deadline: 10 Sep 2023

Subject: Data Structures and Algorithms-Lab

Instructor: Yasmeen Jana

Max Marks: 10

Reg. No: SP22-BCS-017

GitHub Link:

<https://github.com/shahid-Azlan/DSA-LAB-1>

Problem 1:

```
#include <iostream>
using namespace std;
int main() {
    int a = 5, b = 3;
    int *ptr1 = &a, *ptr2 = &b;
    int result = *ptr1 + *ptr2;
    cout << "Sum: " << result << endl;
    cout << "Value of ptr1 is: " << ptr1 << endl;
    cout << "Value of ptr2 is: " << ptr2 << endl;
    return 0;
}
```


```
C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\Addition.exe
Sum: 8
Value of ptr1 is: 0x6ffe08
Value of ptr2 is: 0x6ffe04
-----
Process exited after 1.022 seconds with return value 0
Press any key to continue . . .
```

Problem 2:

```
#include <iostream>
using namespace std;
int main() {
    int a;
    int b;
    cout<<"Enter value of A: ";
    cin >> a;
    cout<<"Enter value of B: ";
    cin >> b;
    int *arr1 = &a;
    int *arr2 = &b;
    int sum = *arr1 + *arr2;
    float average=sum/2.0;
    cout << "Average: " << average << endl;
```

```
return 0;

}
```

 C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\Average.exe

Enter value of A: 23

Enter value of B: 43

Average: 33

Process exited after 12.55 seconds with return value 0

Press any key to continue . . .

Problem 3:

```
#include <iostream>

using namespace std;

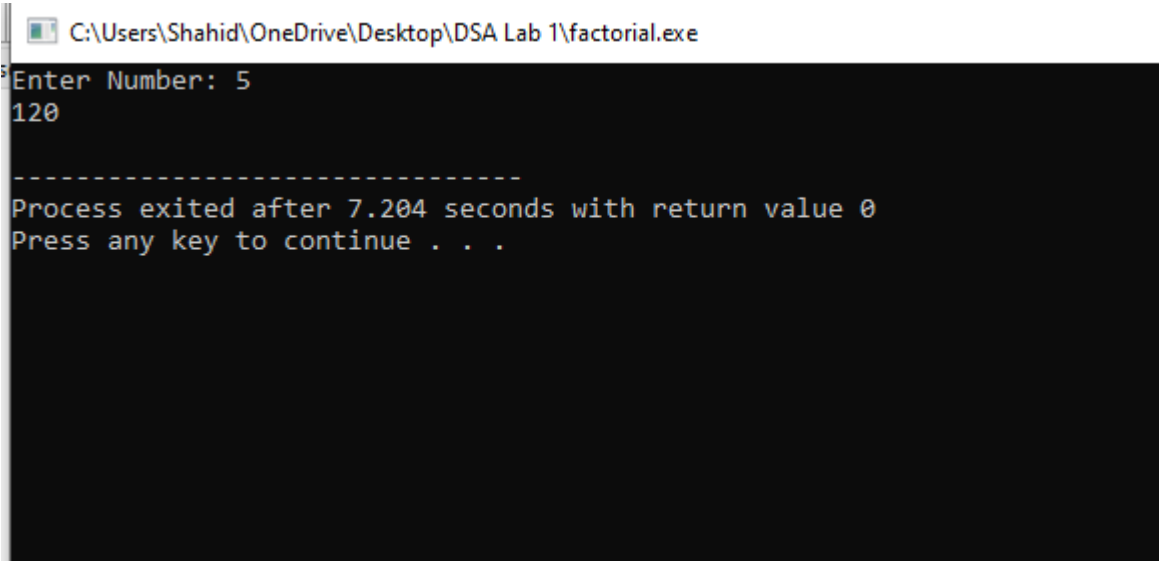
int main() {
    int a = 28, b = 7;
    int *ptr1 = &a, *ptr2 = &b;
    int result = *ptr1 / *ptr2;
    cout << "Division is: " << result << endl;
    cout << "Value of ptr1 is: " << ptr1 << endl;
    cout << "Value of ptr2 is: " << ptr2 << endl;
    return 0;
}
```

```
C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\Division.exe
Division is: 4
Value of ptr1 is: 0x6ffe08
Value of ptr2 is: 0x6ffe04
-----
Process exited after 0.01261 seconds with return value 0
Press any key to continue . . .
```

Problem 4:

```
#include <iostream>
using namespace std;
int factorial(int* n) {
    int result = 1;
    for (int i = 1; i <= *n; i++) {
        result *= i;
    }
    return result;
}
int main() {
    int num;
    cout<<"Enter Number: ";
    cin >> num;
    int* ptr_num = &num;
```

```
int result = factorial(ptr_num);  
    cout << result << endl;  
    return 0;  
}
```



```
C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\factorial.exe  
Enter Number: 5  
120  
-----  
Process exited after 7.204 seconds with return value 0  
Press any key to continue . . .
```

Problem 5:

```
#include <iostream>  
using namespace std;  
int main() {  
    int a;  
    int b;  
    cout<<"Enter value of A :";  
    cin>>a;  
    cout<<"Enter value of B :";  
    cin>>b;  
    int *ptr1 = &a, *ptr2 = &b;  
    if (*ptr1==*ptr2){
```

```

        cout<<"Both numbers are equal";
    } else if (*ptr2>*ptr1){
        int d=*ptr2-*ptr1;
        cout<<"B is "<<d<<" greater than A";
    }
    else{
        int    c=*ptr1-*ptr2;
        cout<<"A is "<<c<<" times greater then B";
    }
    cout << "\nValue of ptr1 is: "<<ptr1<<endl;
    cout << "\nValue of ptr2 is: "<<ptr2<<endl;
    return 0;
}

```

 C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\Greater than.exe

```

Enter value of A :5
Enter value of B :4
A is 1 times greater then B
Value of ptr1 is: 0x6ffe04

Value of ptr2 is: 0x6ffe00

-----
Process exited after 4.435 seconds with return value 0
Press any key to continue . . .

```

Problem 6:

```
#include <iostream>

using namespace std;

int main() {
    int a;
    int b;

    cout<<"Enter value of A: ";
    cin>>a;
    cout<<"Enter value of B: ";
    cin>>b;

    int *ptr1 = &a, *ptr2 = &b;
    if (*ptr1==*ptr2){
        cout<<"Both numbers are equal";
    } else if (*ptr2<*ptr1){
        int d=*ptr1-*ptr2;
        cout<<"B is "<<d<<" times less than A";
    }
    else{
        int c=*ptr2-*ptr1;
        cout<<"A is "<<c<<" times less then B";
    }

    cout << "\nValue of ptr1 is: "<<ptr1<<endl;
    cout << "\nValue of ptr2 is: "<<ptr2<<endl;

    return 0;
}
```

```
C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\Less Than.exe
Enter value of A: 5
Enter value of B: 7
A is 2 times less then B
Value of ptr1 is: 0x6ffe04

Value of ptr2 is: 0x6ffe00

-----
Process exited after 5.958 seconds with return value 0
Press any key to continue . . .
```

Problem 7:

```
#include <iostream>

using namespace std;

int main() {
    int arr[] = {5, 2, 9, 1, 7, 3, 8, 4, 6};
    int n = sizeof(arr) / sizeof(arr[0]);
    int *ptr = arr;
    int max_val = *ptr;
    int min_val = *ptr;

    for (int i = 1; i < n; i++) {
        if (*(ptr + i) > max_val) {
            max_val = *(ptr + i);
        }
        if (*(ptr + i) < min_val) {
            min_val = *(ptr + i);
        }
    }
}
```



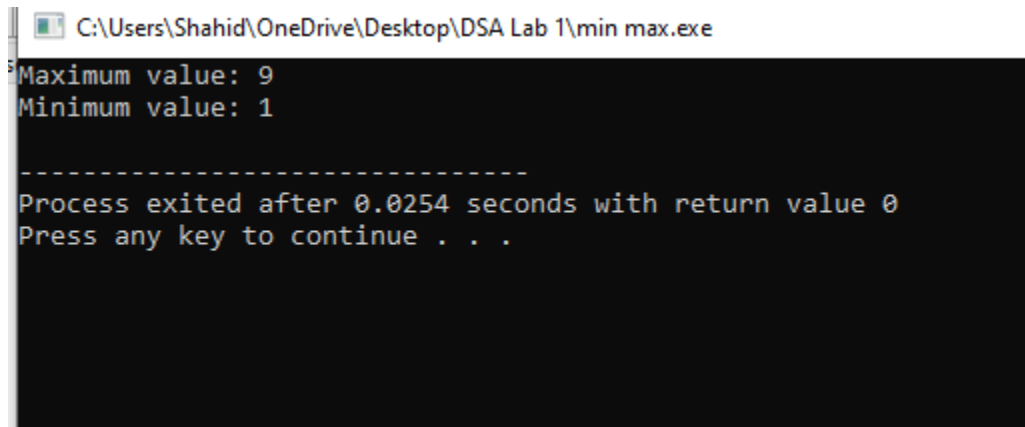
```

cout << "Maximum value: " << max_val << endl;
cout << "Minimum value: " << min_val << endl;

return 0;

}

```



```

C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\min max.exe
Maximum value: 9
Minimum value: 1
-----
Process exited after 0.0254 seconds with return value 0
Press any key to continue . . .

```

Problem 8:

```

#include <iostream>

using namespace std;

int main() {
    int a = 6, b = 9;
    int *ptr1 = &a, *ptr2 = &b;
    int result = *ptr1 * *ptr2;
    cout << "Multiplication is: " << result << endl;
    cout << "Value of ptr1 is: " << ptr1 << endl;
    cout << "Value of ptr2 is: " << ptr2 << endl;
    return 0;
}

```

```
C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\Multiplication.exe
Multiplication is: 54
Value of ptr1 is: 0x6ffe08
Value of ptr2 is: 0x6ffe04
-----
Process exited after 0.02206 seconds with return value 0
Press any key to continue . . .
```

Problem 9:

```
#include <iostream>

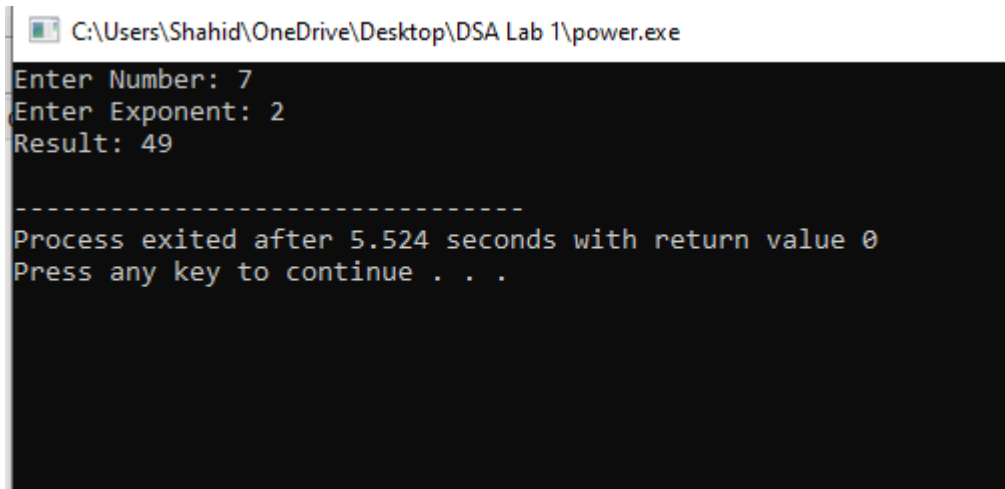
using namespace std;

double power(double *base, int *exponent) {
    double result = 1.0;
    int exp = *exponent;

    if (exp >= 0) {
        for (int i = 0; i < exp; i++) {
            result *= *base;
        }
    } else {
        for (int i = 0; i < -exp; i++) {
            result /= *base;
        }
    }

    return result;
}
```

```
int main() {  
    double base;  
    int exponent;  
    cout<<"Enter Number: ";  
    cin >> base;  
    cout<<"Enter Exponent: ";  
    cin >> exponent;  
    double *ptr_base = &base;  
    int *ptr_exponent = &exponent;  
  
    double result = power(ptr_base, ptr_exponent);  
  
    cout << "Result: " << result << endl;  
  
    return 0;  
}
```



```
C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\power.exe  
Enter Number: 7  
Enter Exponent: 2  
Result: 49  
  
-----  
Process exited after 5.524 seconds with return value 0  
Press any key to continue . . .
```

Problem 10:

```
#include <iostream>

using namespace std;

void decimalToBinary(int n) {
    int binary[32];
    int* ptr = binary;

    int i = 0;
    while (n > 0) {
        *(ptr + i) = n % 2;
        n /= 2;
        i++;
    }

    for (int j = i - 1; j >= 0; j--) {
        cout << *(ptr + j);
    }
}

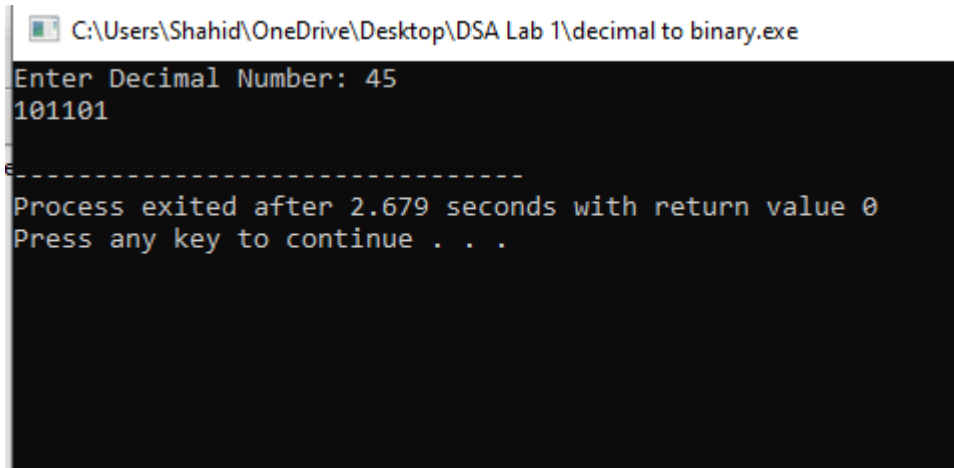
int main() {
    int decimal;
    cout<<"Enter Decimal Number: ";
    cin >> decimal;

    decimalToBinary(decimal);
}
```

```
cout << endl;
```

```
return 0;
```

```
}
```



```
C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\decimal to binary.exe
Enter Decimal Number: 45
101101
-----
Process exited after 2.679 seconds with return value 0
Press any key to continue . . .
```

Problem 11:

```
#include <iostream>
```

```
using namespace std;
```

```
int main() {
```

```
int a = 24, b = 12;
```

```
int *ptr1 = &a, *ptr2 = &b;
```

```
int result = *ptr1 - *ptr2;
```

```
cout << "subtraction is: " << result << endl;
```

```
cout << "Value of ptr1 is: " << ptr1 << endl;
```

```
cout << "Value of ptr2 is: " << ptr2 << endl;
```

```
return 0;
```

```
}
```

```
C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\subtraction.exe
subtraction is: 12
Value of ptr1 is: 0x6ffe08
Value of ptr2 is: 0x6ffe04

-----
Process exited after 0.02694 seconds with return value 0
Press any key to continue . . .
```

Problem 12:

```
#include <iostream>

using namespace std;

int main() {
    int a, b;

    cout << "Enter First Number: ";

    cin >> a;

    cout << "Enter Second Number: ";

    cin >> b;

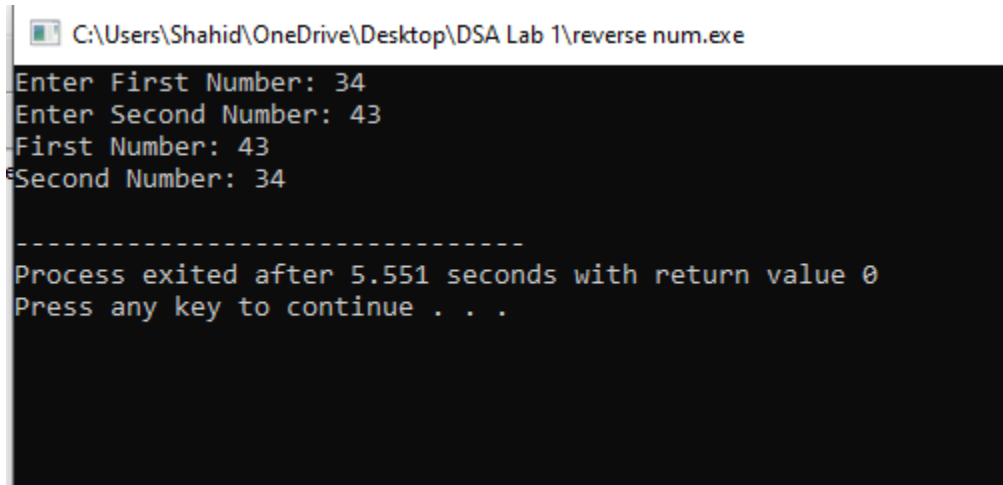
    int* ptrA = &a;
    int* ptrB = &b;

    *ptrA = *ptrA + *ptrB;
    *ptrB = *ptrA - *ptrB;
    *ptrA = *ptrA - *ptrB;

    cout << "First Number: " << *ptrA << "\nSecond Number: " << *ptrB << endl;
```

```
return 0;

}
```



```
C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\reverse num.exe
Enter First Number: 34
Enter Second Number: 43
First Number: 43
Second Number: 34

-----
Process exited after 5.551 seconds with return value 0
Press any key to continue . . .
```

Problem 13:

```
#include <iostream>

using namespace std;

bool isPrime(int *n) {
    if (*n <= 1) {
        return false;
    }

    for (int i = 2; i <= (*n) / 2; i++) {
        if ((*n) % i == 0) {
            return false;
        }
    }

    return true;
}
```

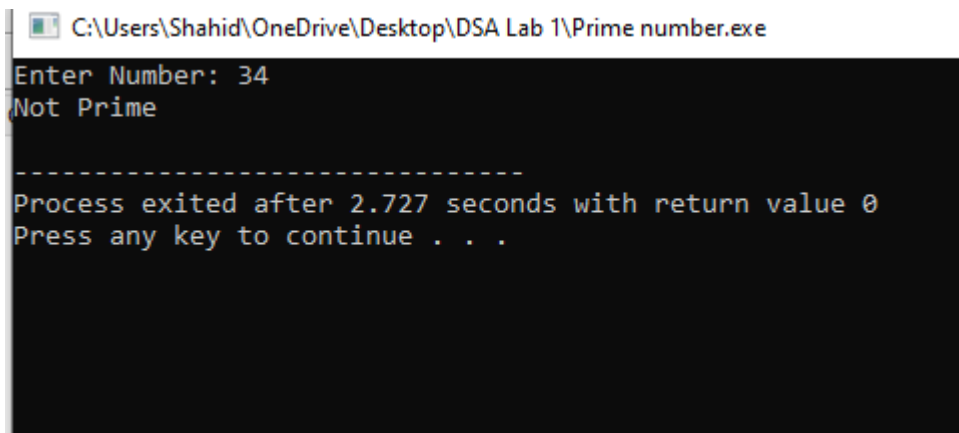
```

int main() {
    int num;
    cout<<"Enter Number: ";
    cin >> num;
    int *ptr_num = &num;

    if (isPrime(ptr_num)) {
        cout << "Prime" << endl;
    } else {
        cout << "Not Prime" << endl;
    }

    return 0;
}

```



```

C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\Prime number.exe
Enter Number: 34
Not Prime

-----
Process exited after 2.727 seconds with return value 0
Press any key to continue . . .

```

Problem 14:

```

#include <iostream>

using namespace std;

void reverseString(char *str) {

```



```
char *start = str;
```

```
char *end = str;
```

```
while (*end != '\0') {
```

```
    end++;
```

```
}
```

```
end--;
```

```
while (start < end) {
```

```
    char temp = *start;
```

```
    *start = *end;
```

```
    *end = temp;
```

```
    start++;
```

```
    end--;
```

```
}
```

```
}
```

```
int main() {
```

```
    char str[100];
```

```
    cout<<"Enter String: ";
```

```
    cin >> str;
```

```
    reverseString(str);
```

```
    cout << str << endl;
```

```
    return 0;
```

```
}
```

```
C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\reverseString.exe
Enter String: shahid
dihahs

-----
Process exited after 9.146 seconds with return value 0
Press any key to continue . . .
```

Problem 15:

```
#include <iostream>

using namespace std;

int main() {
    int x = 10;
    int* ptr = &x;
    *ptr += 5;

    cout <<"Value of x is: " <<x << endl;
    cout <<"Value of increment x is: " << *ptr << endl;
    cout <<"address of ptr is: " << ptr << endl;

    return 0;
}
```

```
C:\Users\Shahid\OneDrive\Desktop\DSA Lab 1\increment.exe
Value of x is: 15
Value of increment x is: 15
address of ptr is: 0x6ffe04

-----
Process exited after 0.03339 seconds with return value 0
Press any key to continue . . .
```