

DISCRETE-MATHEMATICS ASSIGNMENT-3

Name: Subhapreet Patro

Roll No.: 2211CS010547

Class: Group-7A

1. Using Python, find the solution of $a_n - 3a_{n-1} - 4a_{n-2} = 0$ for $n \geq 2$.

```
import sympy as sp

"""
To find the solution of the recurrence relation  $a_n - 3a_{n-1} - 4a_{n-2} = 0$  for  $n \geq 2$ , we can use
the characteristic equation method.
The characteristic equation for this recurrence relation is obtained by assuming a solution of the
form  $a_n = r^n$  and substituting it into the recurrence relation:
 $r^n - 3r^{n-1} - 4r^{n-2} = 0$ 
Divide both sides by  $r^{n-2}$  to simplify:
 $r^2 - 3r - 4 = 0$ 
Now, you can solve this quadratic equation to find the values of  $r$ .
"""

# Define the variable
r = sp.symbols('r')

# Define the characteristic equation
characteristic_equation = r**2 - 3*r - 4

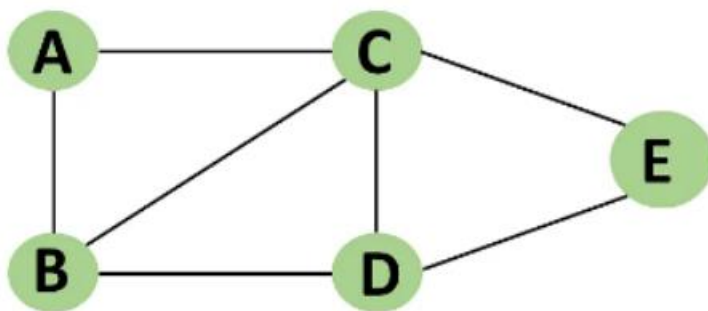
# Solve the characteristic equation
solutions = sp.solve(characteristic_equation, r)

r1, r2 = solutions

# Display the solutions
print(f"Solutions to the characteristic equation: C1({r1})^n + C2({r2})^n")
```

Solutions to the characteristic equation: $C1(-1)^n + C2(4)^n$

2. Use the Python program to find the DFS for the following graph.



UNIVERSITY

```
def DFS(graph,start):
    visited=set()
    stack=[start]
    while stack:
        vertex=stack.pop()
        if vertex not in visited:
            print(vertex,end=" ")
            visited.add(vertex)
            stack.extend(reversed(graph[vertex]))
```

```
"""
Given Graph:
[A]----[C]
|      / \
|     /   \
|    /     \
|   /       \
|  /         \
| /           \
|/            \
[B]----[D]
"""
```

```
G = {"A": ["B", "C"], "B": ["A", "C", "D"], "C": ["A", "B", "D", "E"], "D": ["B", "C", "E"], "E": ["C", "D"]}
start_vertex = "A"
print("Depth First Search: ", end="")
DFS(G, start_vertex)
```

Depth First Search: A B C D E