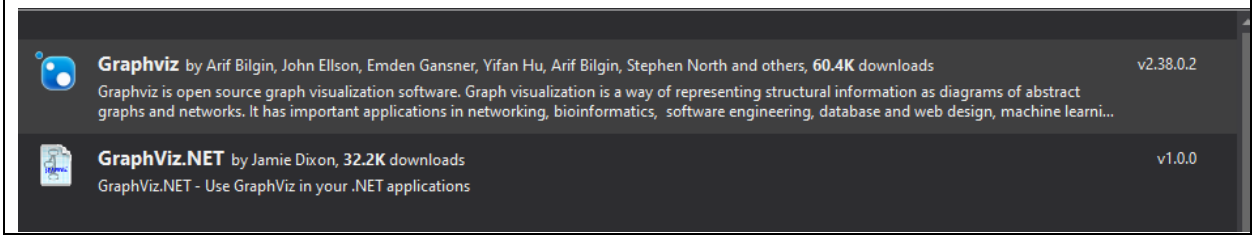
# CPSC 5031 Homework 6

# Visualizing Graphs

Name: David Nguyen

| Description |
| --- |
| Write a program that can take an adjacencymatrixfile and generate a GraphViz “dot file”. Run the dot files through `dot`(one of the GraphViz command line tools) and generate a PNG file. |

| Summary after completed the homework |
| --- |
| It is a great way to build a graph using GraphViz and it is even more fun to build a tool in my own favorite language to implement this GraphViz API.<br><br>I started using MS-Test to add test cases for my program. One lesson I have learned, that the more test cases I added, the more updates I need to add into my function/methods. Clearly, adding test cases is a great way to see what are you missing in your function and discover the bugs at very early stage.<br><br>After finishing this homework, I also discovery some develop already built Nuget package that I can use for real application in the future.<br><br>  <br> |

| Assumption to run this tool |
| --- |
| 1. Maximum of nodes for a graph is 24 (starting with letter A to Z)<br>2. Required user to provide text file and its location<br>3. Tool only run on Windows OS |

| **Source code** |
| --- |
| https://github.com/davednguyen/cpsc5031_hw6.git |
| **Branch** |
| Develop |
| Main code project name: cpsc5031_hw6 |
| Test codes project name: GraphVizTestProject |

| Total test cases: 24 | | |
|---|---|---|
| Test framework: MS Test | | |
| Language: C3 | | |
| Test case name | Expected result | Actual result |
| TestCase_4by4Matrix_1_HappyPath_Graph | True | True |
| TestCase_4by4Matrix_2_HappyPath_Graph | True | True |
| TestCase_5by5Matrix_1_HappyPath_Graph | True | True |
| TestCase_6by6Matrix_1_HappyPath_Graph | True | True |
| TestCase_4by4Matrix_1_HappyPath_Digraph | True | True |
| TestCase_4by4Matrix_2_HappyPath_Digraph | True | True |
| TestCase_5by5Matrix_1_HappyPath_Digraph | True | True |
| TestCase_6by6Matrix_1_HappyPath_Digraph | True | True |
| TestCase_Check_EmptyTextFile_Graph | False | False |
| TestCase_Check_EmptyTextFile_digraph | False | False |
| TestCase_Check_NoTextFileFoundInTheFolder_Graph | False | False |
| TestCase_Check_NoTextFileFoundInTheFolder_dgraph | False | False |
| TestCase_Check_TextFileHasSpecialCharactersMixWith_0_and_1_Graph | True | True |
| TestCase_Check_TextFileHasSpecialCharactersMixWith_0_and_1_dgraph | True | True |
| TestCase_Check_TextFileHasSpecialCharactersOnly_Graph | True | True |
| TestCase_Check_TextFileHasSpecialCharactersOnly_Dgraph | True | True |
| TestCase_Check_TextFileHas_1_Only_Graph | True | True |
| TestCase_Check_TextFileHas_1_Only_dgraph | True | True |
| TestCase_Check_TextFileHas_0_Only_Graph | True | True |
| TestCase_Check_TextFileHas_0_Only_dgraph | True | True |
| TestCase_Check_TextFileHas_24_nodes_Graph | True | True |
| TestCase_Check_TextFileHas_24_nodes_dgraph | True | True |
| TestCase_Check_TextFileHas_25_nodes_Graph_EdgeCase | True | True |
| TestCase_Check_TextFileHas_25_nodes_dgraph_EdgeCase | True | True |

| | |
|---|---|
| GraphVizTestProject (24) | 3.3 sec |
| GraphVizTestProject (24) | 3.3 sec |
| Main (24) | 3.3 sec |
| TestCase_4by4Matrix_1_HappyPath_Digraph | 76 ms |
| TestCase_4by4Matrix_1_HappyPath_Graph | 66 ms |
| TestCase_4by4Matrix_2_HappyPath_Digraph | 68 ms |
| TestCase_4by4Matrix_2_HappyPath_Graph | 81 ms |
| TestCase_5by5Matrix_1_HappyPath_Digraph | 228 ms |
| TestCase_5by5Matrix_1_HappyPath_Graph | 76 ms |
| TestCase_6by6Matrix_1_HappyPath_Digraph | 114 ms |
| TestCase_6by6Matrix_1_HappyPath_Graph | 101 ms |
| TestCase_Check_EmptyTextFile_digraph | 60 ms |
| TestCase_Check_EmptyTextFile_Graph | 44 ms |
| TestCase_Check_NoTextFileFoundInTheFolder_dgraph | 40 ms |
| TestCase_Check_NoTextFileFoundInTheFolder_Graph | 152 ms |
| TestCase_Check_TextFileHas_0_Only_dgraph | 65 ms |
| TestCase_Check_TextFileHas_0_Only_Graph | 72 ms |
| TestCase_Check_TextFileHas_1_Only_dgraph | 68 ms |
| TestCase_Check_TextFileHas_1_Only_Graph | 72 ms |
| TestCase_Check_TextFileHas_24_nodes_dgraph | 311 ms |
| TestCase_Check_TextFileHas_24_nodes_Graph | 343 ms |
| TestCase_Check_TextFileHas_25_nodes_dgraph_EdgeCase | 407 ms |
| TestCase_Check_TextFileHas_25_nodes_Graph_EdgeCase | 387 ms |
| TestCase_Check_TextFileHasSpecialCharactersMixWith_0_and_1_dgraph | 62 ms |
| TestCase_Check_TextFileHasSpecialCharactersMixWith_0_and_1_Graph | 167 ms |
| TestCase_Check_TextFileHasSpecialCharactersOnly_Dgraph | 159 ms |
| TestCase_Check_TextFileHasSpecialCharactersOnly_Graph | 51 ms |

| Name | Date modified | Type | Size |
|---|---|---|---|
| adj1.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj2.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj3.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj4.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj5.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj6.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj7.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj8.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj11.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj12.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj13.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj14.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj15.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj16.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj17.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj18.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj19.dot | 5/27/2021 5:25 PM | Microsoft Word 9... | 1 KB |
| adj1.png | 5/27/2021 5:25 PM | PNG File | 8 KB |
| adj2.png | 5/27/2021 5:25 PM | PNG File | 13 KB |
| adj3.png | 5/27/2021 5:25 PM | PNG File | 15 KB |
| adj4.png | 5/27/2021 5:25 PM | PNG File | 52 KB |
| adj5.png | 5/27/2021 5:25 PM | PNG File | 8 KB |
| adj6.png | 5/27/2021 5:25 PM | PNG File | 13 KB |
| adj7.png | 5/27/2021 5:25 PM | PNG File | 17 KB |
| adj8.png | 5/27/2021 5:25 PM | PNG File | 55 KB |
| adj11.png | 5/27/2021 5:25 PM | PNG File | 8 KB |
| adj12.png | 5/27/2021 5:25 PM | PNG File | 1 KB |
| adj13.png | 5/27/2021 5:25 PM | PNG File | 21 KB |
| adj14.png | 5/27/2021 5:25 PM | PNG File | 22 KB |
| adj15.png | 5/27/2021 5:25 PM | PNG File | 4 KB |
| adj16.png | 5/27/2021 5:25 PM | PNG File | 442 KB |
| adj17.png | 5/27/2021 5:25 PM | PNG File | 451 KB |
| adj18.png | 5/27/2021 5:25 PM | PNG File | 590 KB |
| adj19.png | 5/27/2021 5:25 PM | PNG File | 598 KB |
| adj1.txt | 5/26/2021 11:41 AM | Text Document | 1 KB |
| adj2.txt | 5/26/2021 7:54 PM | Text Document | 1 KB |
| adj3.txt | 5/26/2021 8:06 PM | Text Document | 1 KB |
| adj4.txt | 5/26/2021 8:09 PM | Text Document | 1 KB |
| adj5.txt | 5/27/2021 2:48 PM | Text Document | 0 KB |

Text files to test

Adj1.txt

adj1.txt - Notepad

File Edit Format View Help

```
0 0 1 1
0 0 1 1
1 1 0 0
1 1 0 0
```

Adj2.txt

adj2.txt - Notepad

File Edit Format View Help

```
0 1 0 1
1 0 1 0
0 1 0 1
1 0 1 0
```

Adj3.txt

adj3.txt - Notepad

File Edit Format View Help

```
0 1 0 1 1
0 0 0 1 0
0 0 0 0 1
0 0 0 0 0
0 1 0 0 0
```

Adj4.txt

adj4.txt - Notepad

File Edit Format View Help

```
1 1 1 1 0 1
1 1 1 1 1 1
1 1 1 1 1 1
1 1 1 1 0 1
1 1 1 1 1 1
1 1 1 1 1 1
```

Adj5.txt

adj5.txt - Notepad

File Edit Format View Help

Adj6.txt

adj6.txt - Notepad

File Edit Format View Help

| | | | |
|---|---|---|---|
| & | @ | 1 | 1 |
| 0 | & | 1 | 1 |
| @ | 1 | & | 0 |
| 1 | 1 | 0 | & |

Adj7.txt

adj7.txt - Notepad

File Edit Format View Help

| | | | |
|---|---|---|---|
| & | @ | * | ^ |
| & | & | # | @ |
| @ | $ | & | % |
| $ | ~ | + | & |

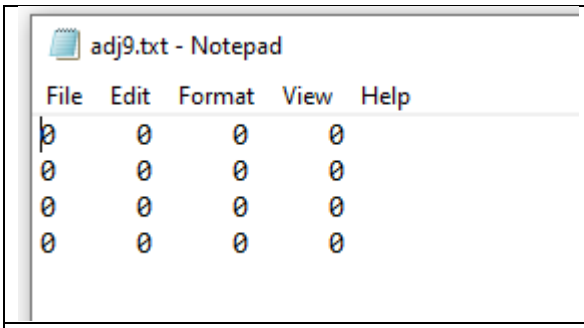
Adjt8.txt

adj8.txt - Notepad

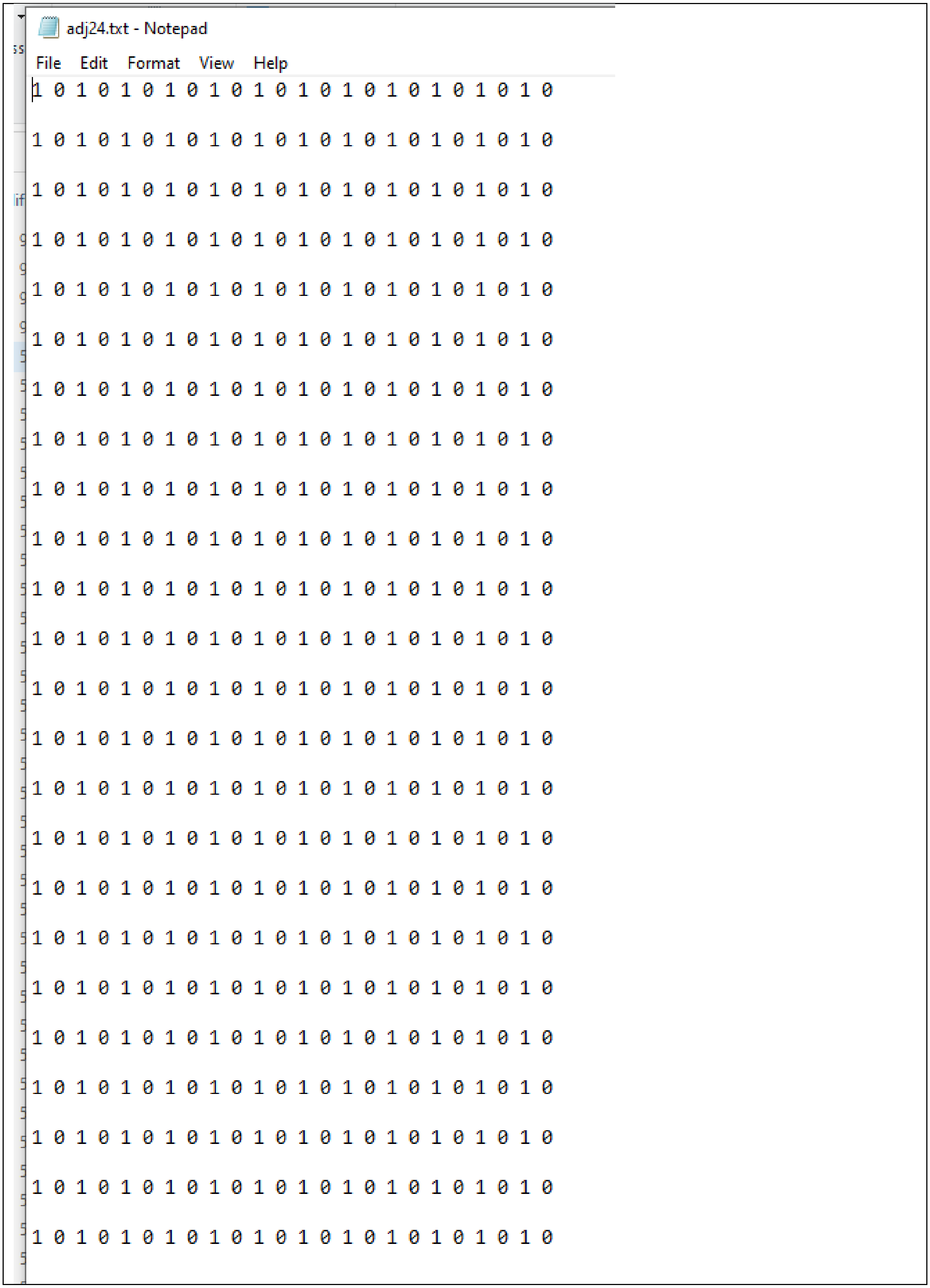
File Edit Format View Help

| | | | |
|---|---|---|---|
| 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 |

Adjt9.txt


adj9.txt - Notepad
File Edit Format View Help
0 0 0 0
0 0 0 0
0 0 0 0
0 0 0 0

Adj24.txt



```
1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

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1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0
```
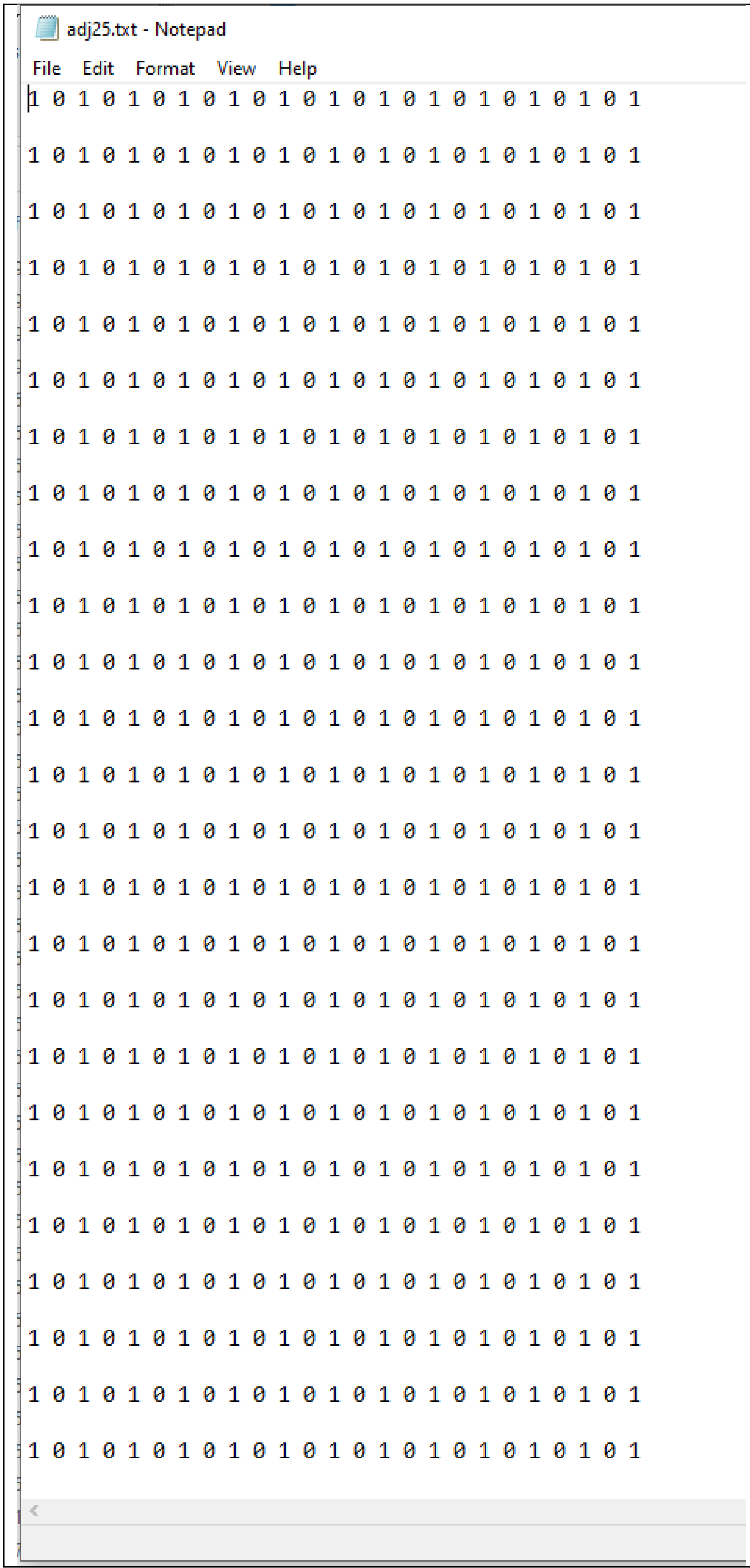

Adj25.txt



```
1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1

1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1

1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1

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1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1

1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1
```
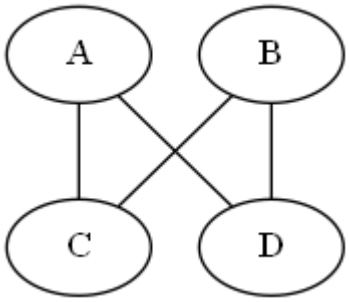
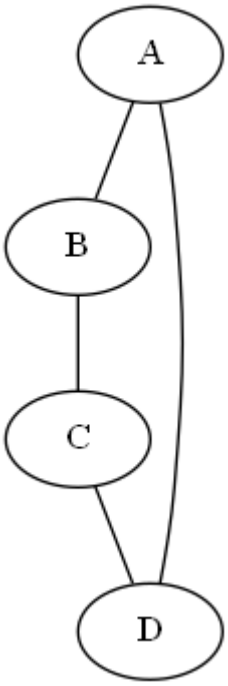
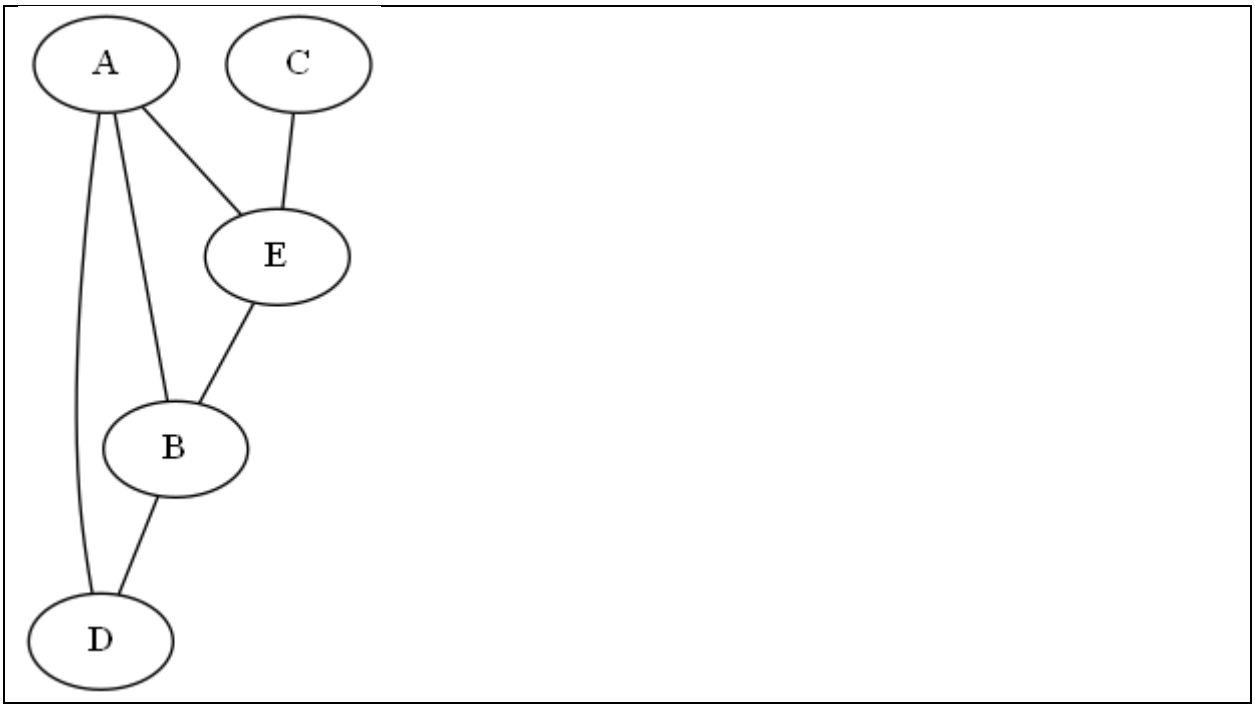
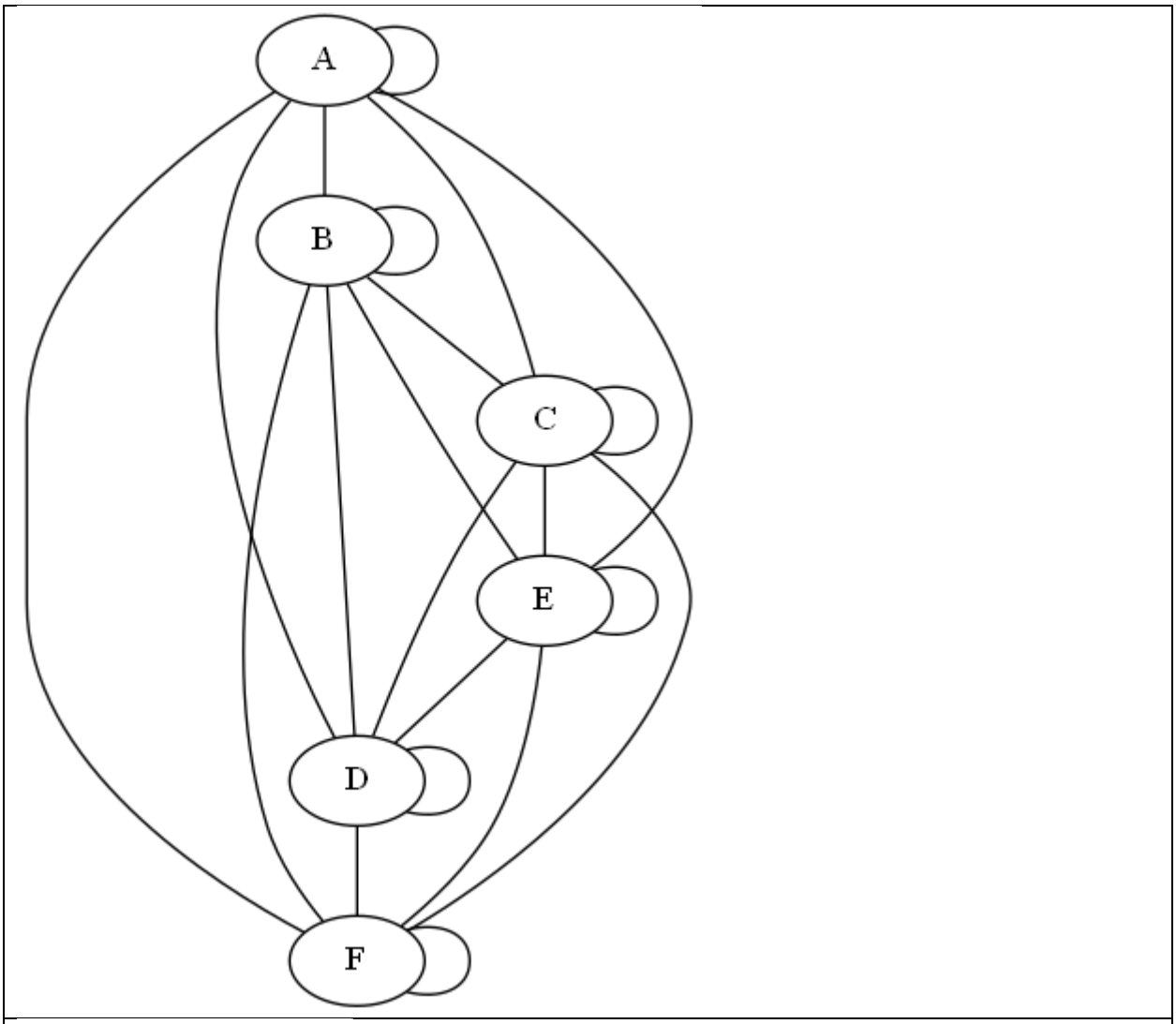
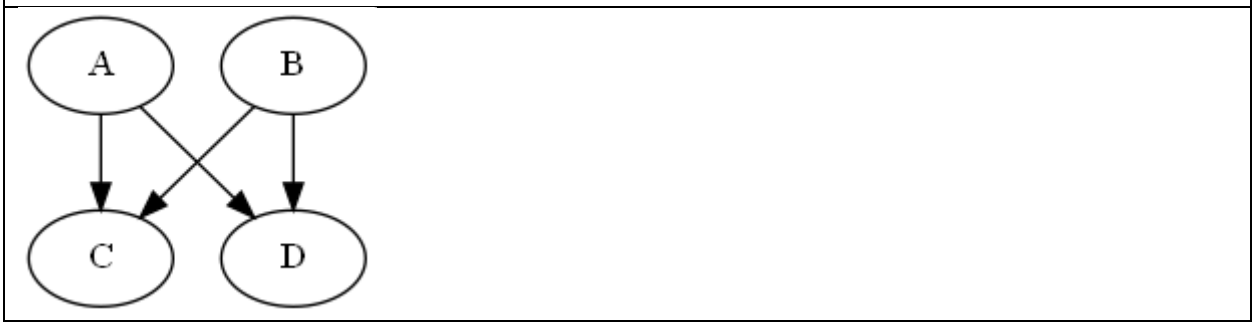
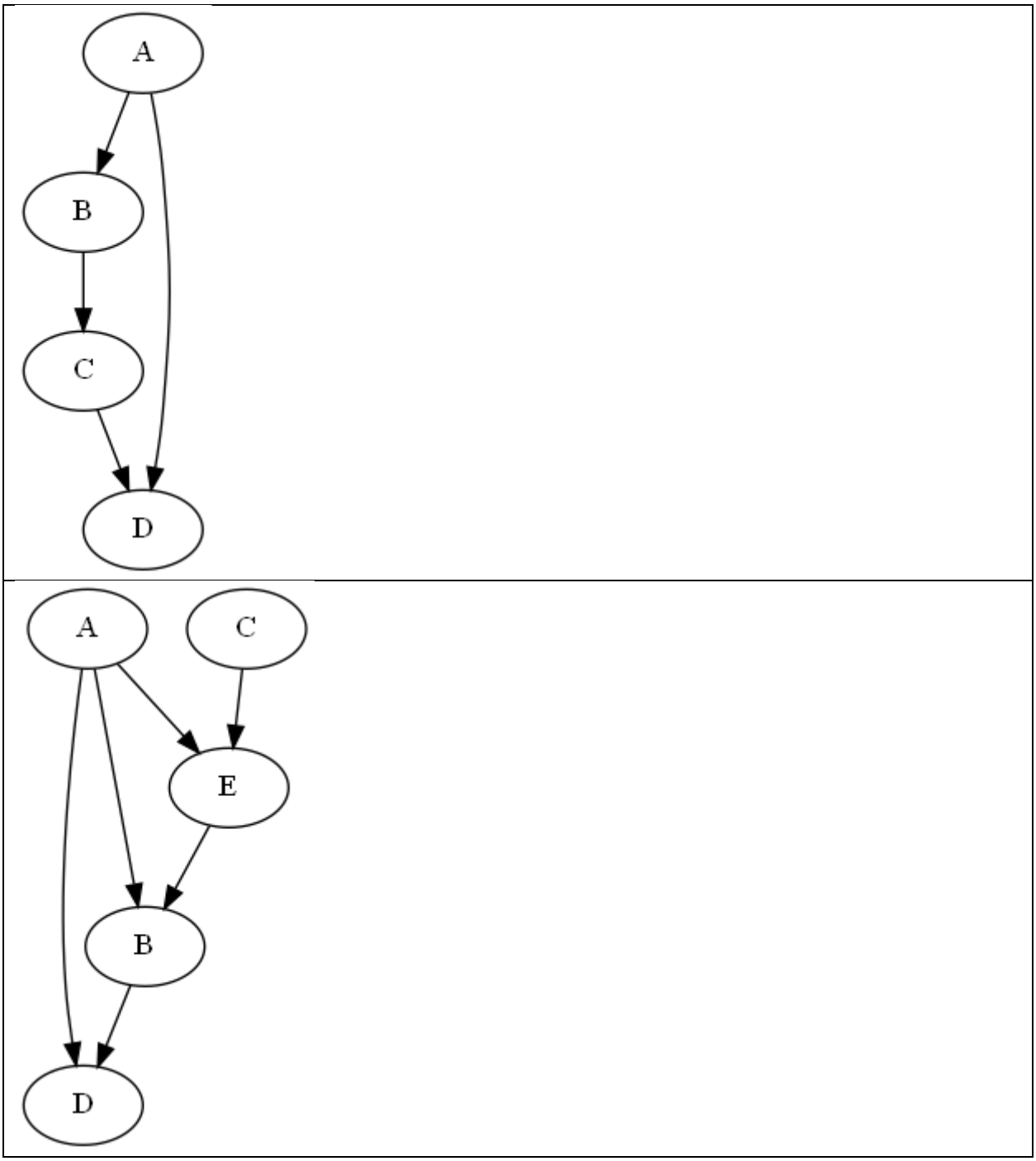
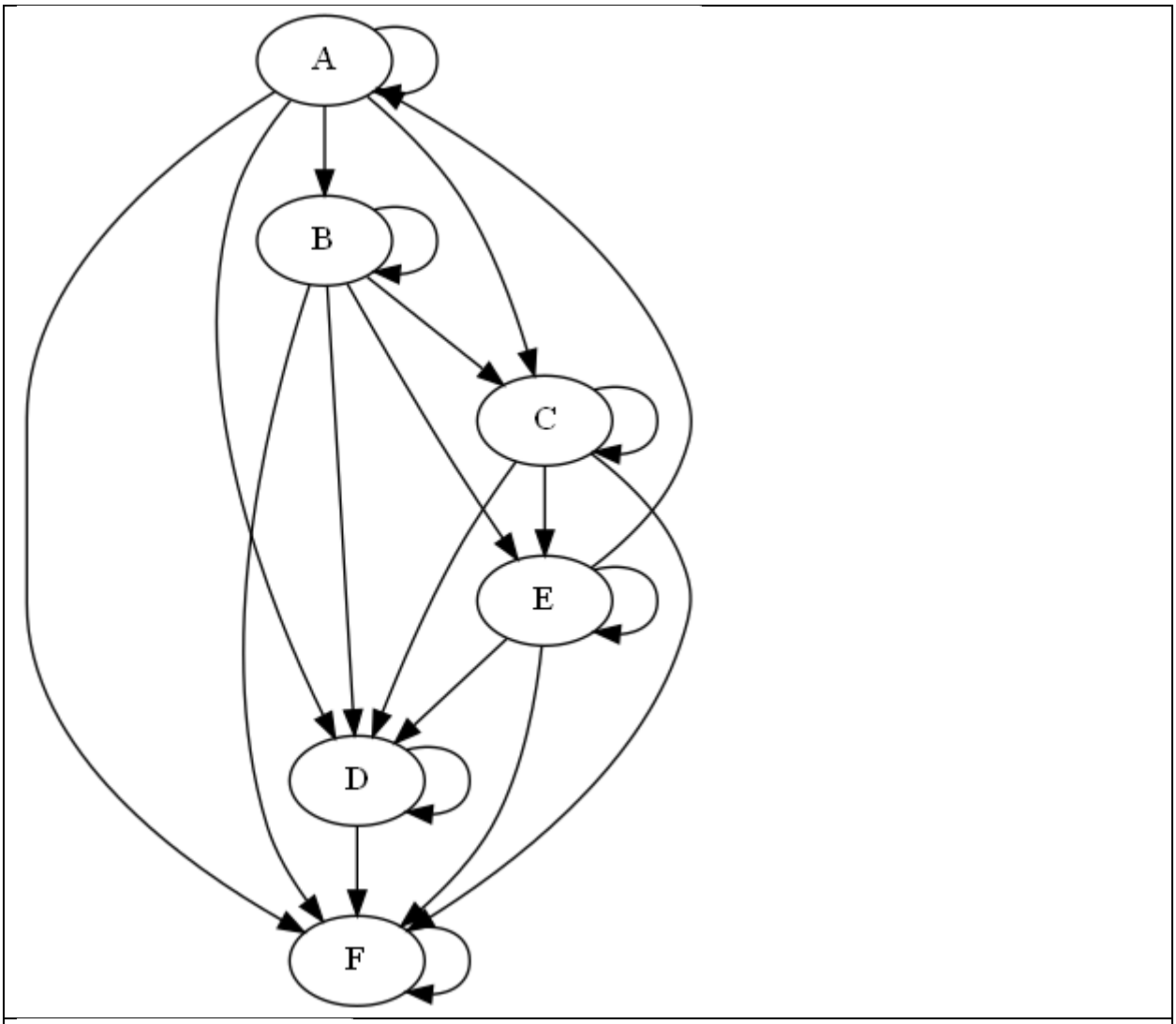

| Images generated by the tools (after rand the test) please refer to github folder for all individual images. |
| --- |
|   |
|   |

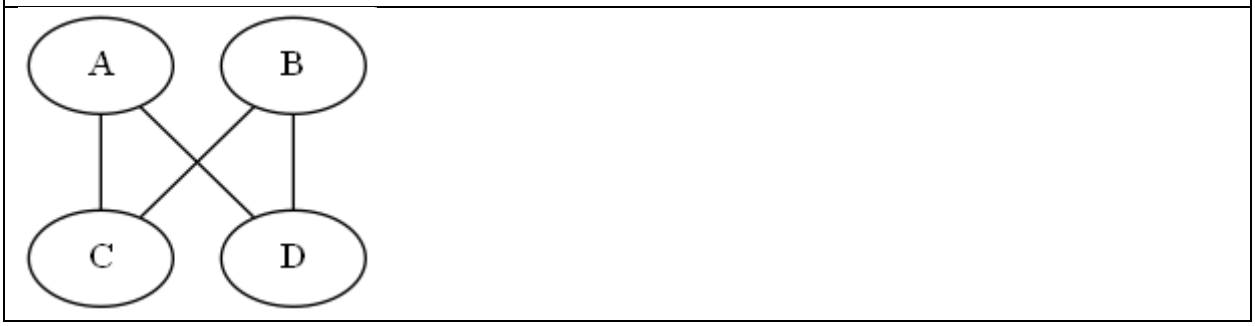

A
C
E
B
D

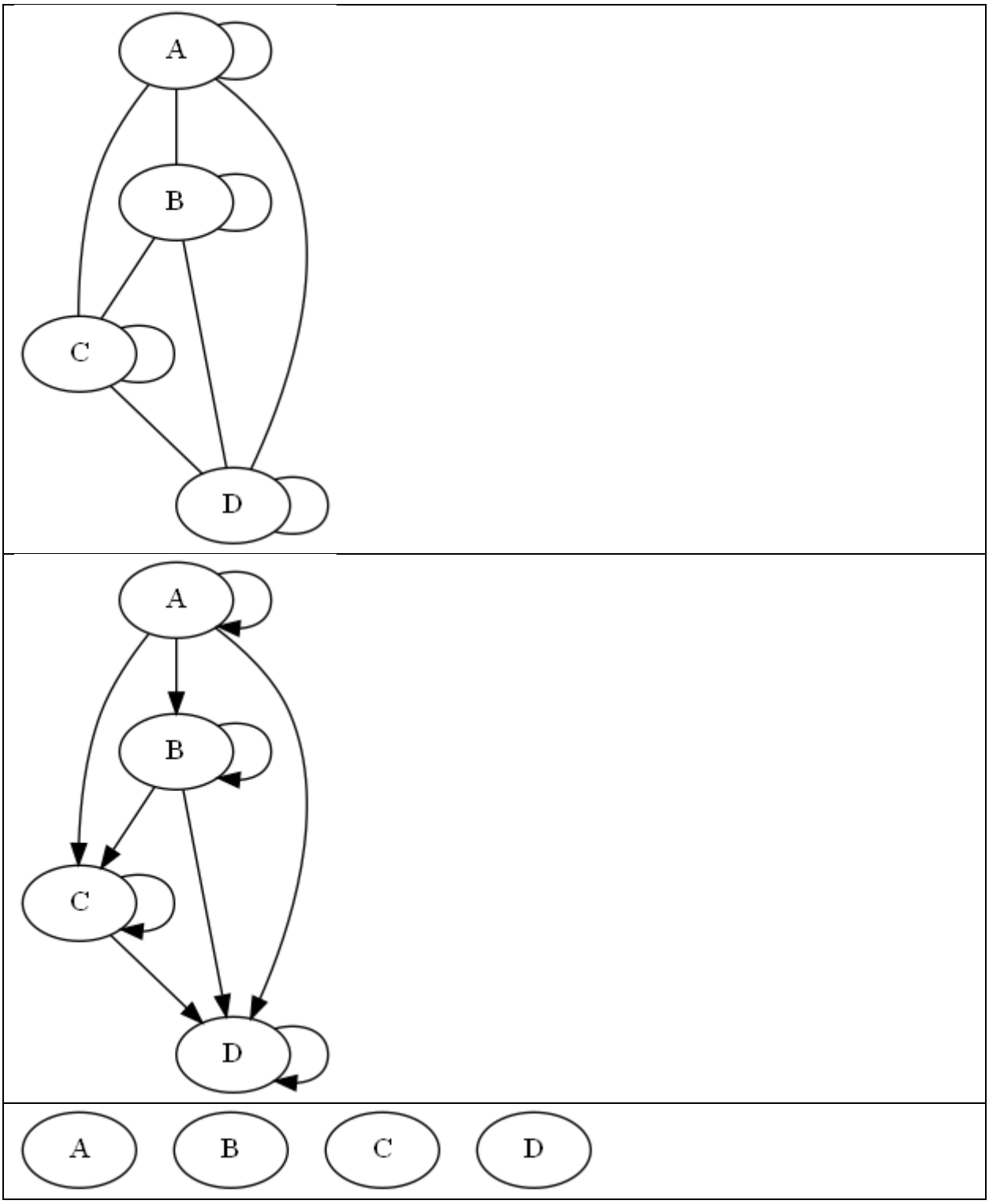

A
B
C
E
D
F


A
B
C
D


A
B
C
D
A
C
E
B
D


A
B
C
E
D
F


A
B
C
D


A
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C
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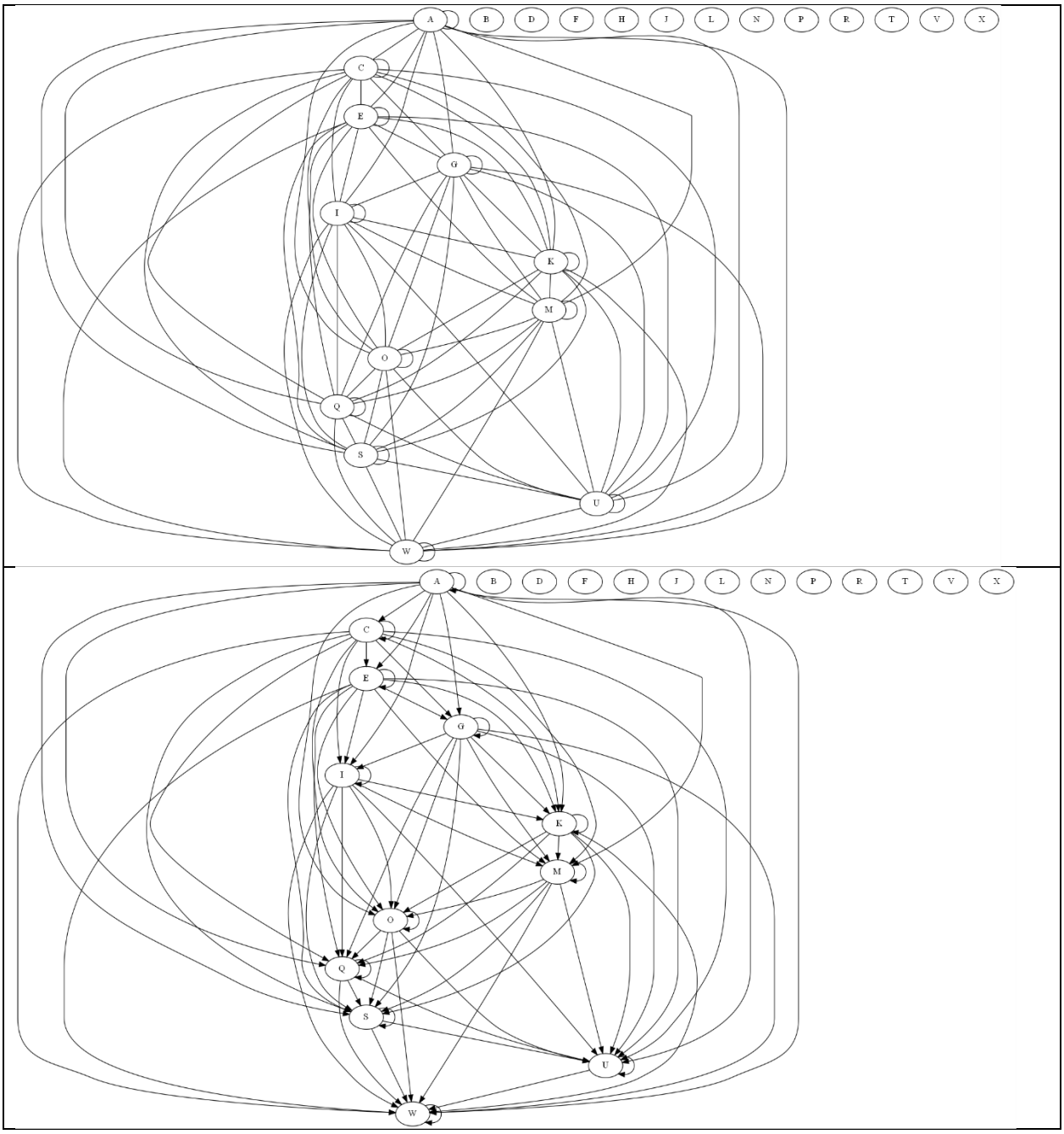
A
B
C
D
A
B
C
D


A
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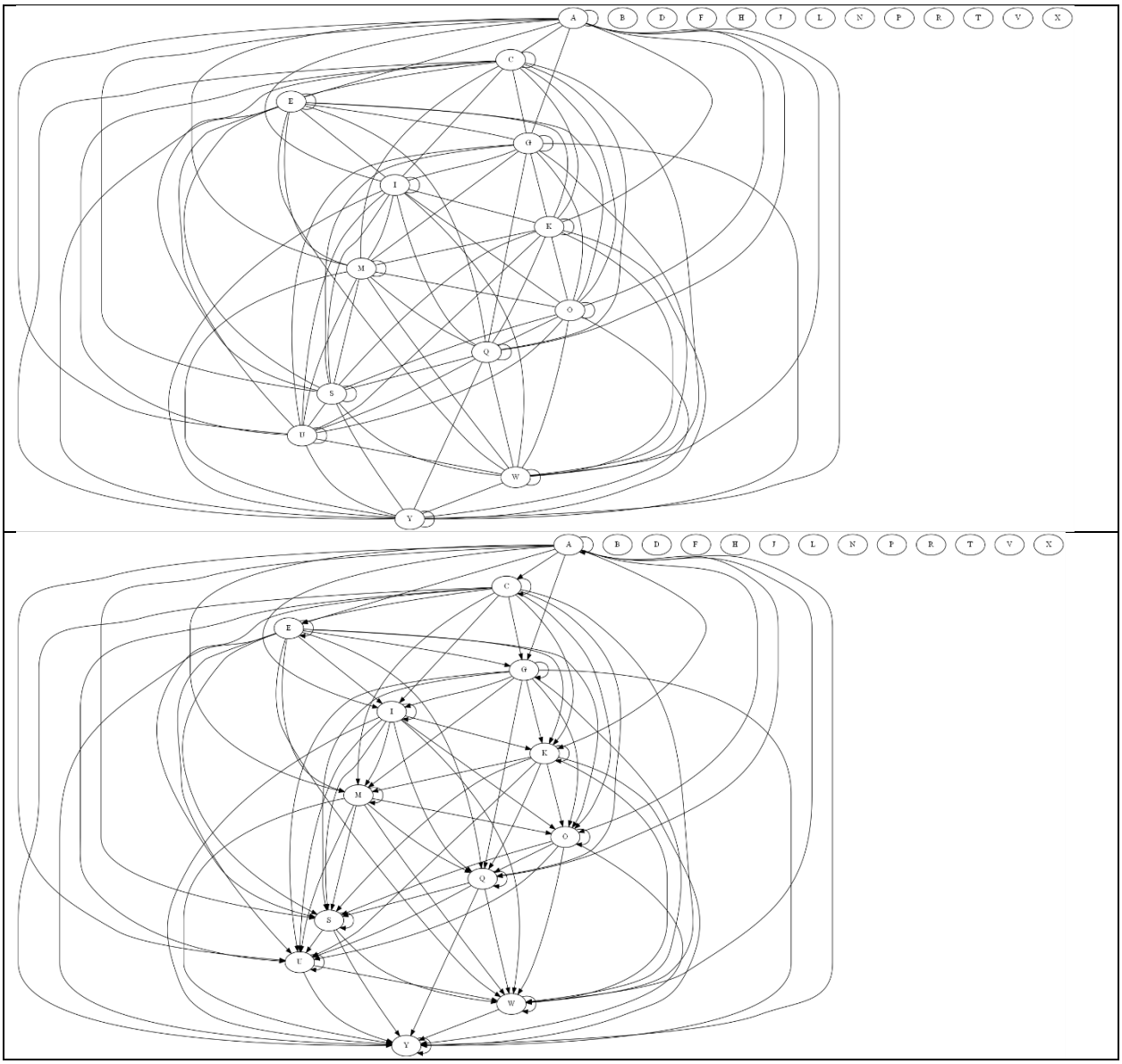


| Main tool codes (for better view, please refer to text file attachment) best application to view C# codes is NodePad++ - (file name: MainToolCodesInCSharp.txt) |
|---|
| using System;<br>using System.Collections.Generic;<br>using System.Diagnostics;<br>using System.IO;<br><br>/// <summary><br>/// Homework 6<br>/// developer: David Nguyen |

```
/// </summary>
namespace cpsc5031_hw6
{
   public class Program
   {
      public static void Main(string[] args)
      {
         Console.WriteLine("Homework 6");
         string directory = @"C:\Users\dzzn\Desktop\CPSC5031_02\week8\homework6\files\";
         //string directory =
@"C:\Users\mr4eyesn\Desktop\CPSC5031_2\week8\homework\code\cpsc5031_hw6\files\"
;
         //GraphVizGenerator("adj1.txt", "adj1.png", "adj1.dot", directory, false);
         //GraphVizGenerator("adj2.txt", "adj2.png", "adj2.dot", directory, false);
         //GraphVizGenerator("adj3.txt", "adj3.png", "adj3.dot", directory, false);
         //GraphVizGenerator("adj4.txt", "adj4.png", "adj4.dot", directory, false);

         //GraphVizGenerator("adj1.txt", "adj5.png", "adj5.dot", directory, true);
         //GraphVizGenerator("adj2.txt", "adj6.png", "adj6.dot", directory, true);
         //GraphVizGenerator("adj3.txt", "adj7.png", "adj7.dot", directory, true);
         //GraphVizGenerator("adj4.txt", "adj8.png", "adj8.dot", directory, true);

         GraphVizGenerator("adj24.txt", "adj17.png", "adj17.dot", directory, false);
      }

      /// <summary>
      /// Generate a graph base on matrix of binary number (0 and 1)
      /// </summary>
      /// <param name="textFileName">matrix text file name provide by user</param>
      /// <param name="imageFileName">image file name provide by user</param>
      /// <param name="dotFileName">dot file name provide by user</param>
      /// <param name="directory">location where to get text file, to save dot file and to save
image file</param>
      public static bool GraphVizGenerator(string textFileName, string imageFileName, string
dotFileName, string directory, bool digraph)
      {
         //null check for all required inputs
         if(textFileName != null || imageFileName != null || dotFileName != null || directory !=
null)
         {
            //check to make sure user don't provide empty string for any inputs
            if(!textFileName.Equals(string.Empty) || !imageFileName.Equals(string.Empty) ||
!dotFileName.Equals(string.Empty) || !directory.Equals(string.Empty))
            {
```

```
                var lines = readTextFile(directory + textFileName);
                var dotFileBody = generateDotFileBody(lines, digraph);
                var dotFilePath = directory + dotFileName;
                var dotFile = dotFileCompose(dotFileBody, dotFilePath);
                generateImage(dotFile, imageFileName, directory);
                if (File.Exists(directory + imageFileName))
                {
                    return true;
                }
                else
                {
                    return false;
                }
            }
            else
            {
                return false;
            }
        }
        else
        {
            return false;
        }
    }

    /// <summary>
    ///
    /// </summary>
    /// <param name="textFileName"></param>
    /// <param name="imageFileName"></param>
    /// <param name="dotFileName"></param>
    /// <param name="directory"></param>
    /// <returns></returns>
    public bool GraphVizGeneratorV2(string textFileName, string imageFileName, string
dotFileName, string directory, bool digraph)
    {
        return GraphVizGenerator(textFileName, imageFileName, dotFileName, directory,
digraph);
    }
    /// <summary>
    /// read text file
    /// </summary>
    /// <param name="path">file location</param>
    /// <returns>lines of text files</returns>
```

```
        private static string[] readTextFile(string path)
        {
            //check if the text file provided by user is
            //existed in the foler
            if (File.Exists(path))
            {
                if (path != null)
                {
                    string[] lines;
                    lines = File.ReadAllLines(path);
                    File.Exists(path);
                    if (lines.Length > 0)
                    {
                        return lines;
                    }
                    else
                    {
                        return null;
                    }
                }
                else
                {
                    return null;
                }
            }
            else
            {
                return null;
            }
        }

        /// <summary>
        /// List of pre-populated Node name for a graph
        /// assuming the maximum nodes for a graph is 24
        /// </summary>
        /// <returns>list of node names</returns>
        private static char[] Letters()
        {
            char[] letters =  { 'A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'I', 'J', 'K', 'L', 'M', 'N', 'O', 'P', 'Q', 'R', 'S',
'T', 'U', 'V', 'W', 'X', 'Y', 'Z'};
            return letters;
        }

        /// <summary>
```

```
    /// Take array of string and generate a file body for a dot file
    /// list of connect between nodes within a graph
    /// </summary>
    /// <param name="lines">list of lines between two nodes</param>
    /// <returns>string body for a dot file</returns>
    private static string generateDotFileBody(string[] lines, bool digraph)
    {
        if(lines != null && lines.Length > 0)
        {
            string graph = "graph matrix {";
            string dgraph = "digraph matrix {";
            string lastLine = "}";
            string gconnector = "--";
            string dgconnector = "->";
            string connector = "";
            //assign name for each node in the graph
            var nodes = Letters();
            string dotFileoBody;
            if (digraph)
            {
                dotFileoBody = dgraph + "\n";
                connector = dgconnector;
            }
            else
            {
                dotFileoBody = graph + "\n";
                connector = gconnector;
            }

            //to keep track of all the nodes
            List<string> completedNodes = new List<string>();
            for (int i = 0; i < lines.Length; i++)
            {
                var list = lines[i].Trim().Replace(" ", string.Empty);
                for (int j = 0; j < list.Length; j++)
                {
                    if(j < list.Length && i < list.Length)
                    {
                        if (list[j].Equals('1'))
                        {
                            string part1 = nodes[i] + connector + nodes[j];
                            string part2 = nodes[j] + connector + nodes[i];
                            if (!completedNodes.Contains(part1) &&
!completedNodes.Contains(part2))
```

```
                    {
                        dotFileoBody = dotFileoBody + nodes[i] + connector + nodes[j] + "\n";
                        completedNodes.Add(part1);
                        completedNodes.Add(part2);
                    }
                }
                else if (list[j].Equals('0'))
                {
                    string part1 = nodes[i].ToString();
                    string part2 = nodes[j].ToString();
                    if (!completedNodes.Contains(part1) &&
!completedNodes.Contains(part2))
                    {
                        dotFileoBody = dotFileoBody + nodes[j] + "\n";
                        completedNodes.Add(part1);
                        completedNodes.Add(part2);
                    }
                }
            }
        }
    }
    dotFileoBody = dotFileoBody + lastLine;
    return dotFileoBody;
}
else
{
    return null;
}
}

/// <summary>
/// Build a dot file for graph
/// </summary>
/// <param name="stringbody">Dot file string body</param>
/// <param name="path">location and file name for the dot file</param>
private static string dotFileCompose(string stringbody, string path)
{
    //delete the file if it already exsited in the foler
    if (File.Exists(path))
    {
        File.Delete(path);
    }
    //write text into dot file
    if(stringbody != null && !stringbody.Equals(string.Empty))
```

```
        {
            using (StreamWriter writer = File.CreateText(path))
            {
                writer.Write(stringbody);
                writer.Flush();
                writer.Dispose();
                writer.Close();
            }
            File.Exists(path);
            return path;
        }
        else
        {
            return null;
        }
    }

    /// <summary>
    /// Generate Graph based on dot file
    /// </summary>
    /// <param name="dotFile">dot file name</param>
    /// <param name="imageFile">image file name</param>
    /// <param name="directory"></param>
    private static void generateImage(string dotFile, string imageFile, string directory)
    {
        //delete the image file if it already exsited in the foler
        string exisitingImageFile = directory + imageFile;
        if (File.Exists(exisitingImageFile))
        {
            File.Delete(exisitingImageFile);
        }
        //command to generage image file
        string commandTemplate = "dot -Tpng {0} -o {1}";
        //where to run the command
        string application = "cmd.exe";
        //complete command
        string command = String.Format(commandTemplate, dotFile, imageFile);
        using(Process process = new Process())
        {
            process.StartInfo = new ProcessStartInfo(application)
            {
                RedirectStandardInput = true,
                UseShellExecute = false,
                WorkingDirectory = directory
```

```
            };
            process.Start();
            process.StandardInput.WriteLine(command);
            process.StandardInput.Close();
            process.WaitForExit();
            process.CloseMainWindow();
            process.Close();
        }
    }
  }
}
```

Test cases in codes (for better view, please refer to text file attachment) best application to view C# codes is NodePad++ - (file name: MainToolCodesInCSharp.txt)

```
using Microsoft.VisualStudio.TestTools.UnitTesting;
using cpsc5031_hw6;

namespace GraphVizTestProject
{
    [TestClass]
    public class Main
    {
        //set initial directory for testing
        //string directory =
@"C:\Users\mr4eyesn\Desktop\CPSC5031_2\week8\homework\code\cpsc5031_hw6\files\";
        string directory = @"C:\Users\dzzn\Desktop\CPSC5031_02\week8\homework6\files\";
        [TestMethod]
        public void TestCase_4by4Matrix_1_HappyPath_Graph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj1.txt", "adj1.png", "adj1.dot",
directory, false);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_4by4Matrix_2_HappyPath_Graph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj2.txt", "adj2.png", "adj2.dot",
directory, false);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_5by5Matrix_1_HappyPath_Graph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj3.txt", "adj3.png", "adj3.dot",
directory, false);
            Assert.AreEqual(true, check);
        }
```

```
        [TestMethod]
        public void TestCase_6by6Matrix_1_HappyPath_Graph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj4.txt", "adj4.png", "adj4.dot",
directory, false);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_4by4Matrix_1_HappyPath_Digraph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj1.txt", "adj5.png", "adj5.dot",
directory, true);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_4by4Matrix_2_HappyPath_Digraph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj2.txt", "adj6.png", "adj6.dot",
directory, true);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_5by5Matrix_1_HappyPath_Digraph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj3.txt", "adj7.png", "adj7.dot",
directory, true);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_6by6Matrix_1_HappyPath_Digraph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj4.txt", "adj8.png", "adj8.dot",
directory, true);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_Check_EmptyTextFile_Graph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj5.txt", "adj9.png", "adj9.dot",
directory, false);
            Assert.AreEqual(false, check);
        }

        [TestMethod]
        public void TestCase_Check_EmptyTextFile_digraph()
        {
```

```
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj5.txt", "adj10.png", "adj10.dot",
directory, true);
            Assert.AreEqual(false, check);
        }

        [TestMethod]
        public void TestCase_Check_NoTextFileFoundInTheFolder_Graph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj20.txt", "adj9.png", "adj9.dot",
directory, false);
            Assert.AreEqual(false, check);
        }

        [TestMethod]
        public void TestCase_Check_NoTextFileFoundInTheFolder_dgraph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj20.txt", "adj10.png",
"adj10.dot", directory, true);
            Assert.AreEqual(false, check);
        }

        [TestMethod]
        public void TestCase_Check_TextFileHasSpecialCharactersMixWith_0_and_1_Graph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj6.txt", "adj11.png", "adj11.dot",
directory, false);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_Check_TextFileHasSpecialCharactersMixWith_0_and_1_dgraph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj6.txt", "adj12.png", "adj12.dot",
directory, true);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_Check_TextFileHasSpecialCharactersOnly_Graph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj7.txt", "adj12.png", "adj12.dot",
directory, false);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_Check_TextFileHasSpecialCharactersOnly_Dgraph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj7.txt", "adj13.png", "adj13.dot",
directory, true);
            Assert.AreEqual(true, check);
```

```
        }

        [TestMethod]
        public void TestCase_Check_TextFileHas_1_Only_Graph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj8.txt", "adj13.png", "adj13.dot",
directory, false);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_Check_TextFileHas_1_Only_dgraph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj8.txt", "adj14.png", "adj14.dot",
directory, true);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_Check_TextFileHas_0_Only_Graph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj9.txt", "adj14.png", "adj14.dot",
directory, false);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_Check_TextFileHas_0_Only_dgraph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj9.txt", "adj15.png", "adj15.dot",
directory, true);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_Check_TextFileHas_24_nodes_Graph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj24.txt", "adj16.png",
"adj16.dot", directory, false);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_Check_TextFileHas_24_nodes_dgraph()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj24.txt", "adj17.png",
"adj17.dot", directory, true);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_Check_TextFileHas_25_nodes_Graph_EdgeCase()
```

```
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj25.txt", "adj18.png",
"adj18.dot", directory, false);
            Assert.AreEqual(true, check);
        }

        [TestMethod]
        public void TestCase_Check_TextFileHas_25_nodes_dgraph_EdgeCase()
        {
            Program graph = new Program();
            var check = graph.GraphVizGeneratorV2("adj25.txt", "adj19.png",
"adj19.dot", directory, true);
            Assert.AreEqual(true, check);
        }
    }
}
```