Dunaev Viktor, 3 kurs, 6 group , Variant 23

Task 1

Create.

Task 2

```
fname = NotebookDirectory[] <> "input.txt"
```

```
C:\6_Cemestr\DS_Lagudo\input.txt
```

```
stream = OpenRead[fname];
```

```
information = ReadList[stream, String]
```

```
{/*|I|*/ 6, /*|U|*/ 12, {1,5}, {2,5}, {3,1}, {3,4},
 {3,5}, {4,1}, {4,2}, {4,6}, {5,4}, {6,2}, {6,3}, {6,5}, /*b_1*/ 7,
 /*b_2*/ 4, /*b_3*/ -1, /*b_4*/ -7, /*b_5*/ -2, /*b_6*/ -1}
```

```
numVertex = Read[StringToStream[StringSplit[information[[1]]][[2]]], Number]
```

```
6
```

```
MyVertex = Table[i, {i, 1, numVertex}]
```

```
{1, 2, 3, 4, 5, 6}
```

```
numEdges = Read[StringToStream[StringSplit[information[[2]]][[2]]], Number]
```

```
12
```

```
MyEdges = Table[
  list = StringSplit[information[[i]], {"{", "}", ","}];
  Read[StringToStream[list[[1]]], Number] → Read[StringToStream[list[[2]]], Number],
  {i, 3, 2 + numEdges}
 ]
```

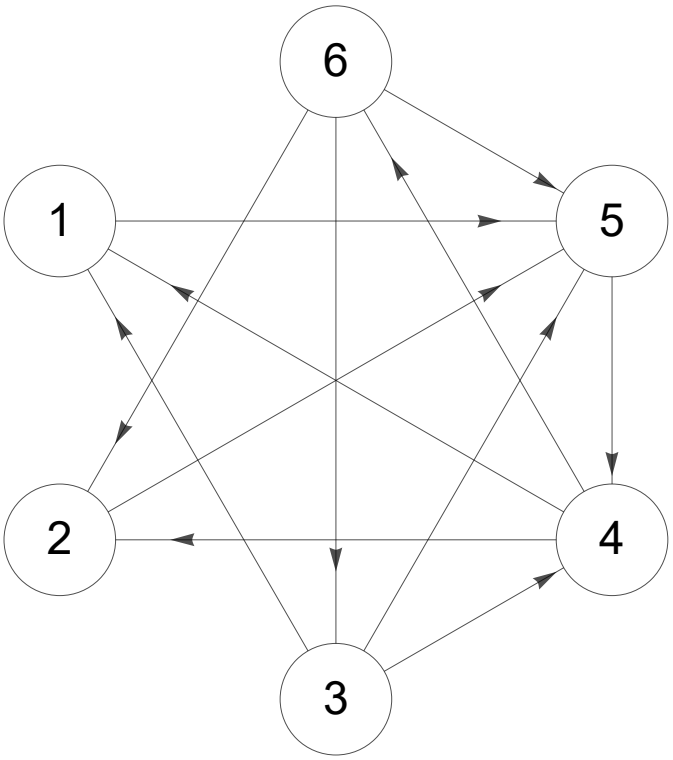
```
{1 → 5, 2 → 5, 3 → 1, 3 → 4, 3 → 5, 4 → 1, 4 → 2, 4 → 6, 5 → 4, 6 → 2, 6 → 3, 6 → 5}
```

```
Close[stream]
```

```
C:\6_Cemestr\DS_Lagudo\input.txt
```

Task 3

```
myGraph = Graph[MyVertex, MyEdges, VertexLabels → Placed["Name", Center],
  GraphLayout → "CircularEmbedding", VertexSize → 0.35, VertexStyle → White,
  EdgeShapeFunction -> GraphElementData["Arrow", "ArrowSize" → 0.035],
  EdgeStyle → Black, VertexLabelStyle → Large]
```



Task 4

```
MyB = Table[
  Read[StringToStream[StringSplit[information[[i]]][[2]]], Number],
  {i, 3 + numEdges, Length[information]}
 ]
```

```
{7, 4, -1, -7, -2, -1}
```

```
Var = {}
```

```
{}
```

```
MySystem = Table[
  eq = 0;
  For[k = 1, k ≤ Length[MyEdges], k++,
   If[MyEdges[[k]][[1]] == i, eq = eq + x_MyEdges[[k]][[1]]MyEdges[[k]][[2]];
    AppendTo[Var, x_MyEdges[[k]][[1]]MyEdges[[k]][[2]]]];
   If[MyEdges[[k]][[2]] == i, eq = eq - x_MyEdges[[k]][[1]]MyEdges[[k]][[2]];
    AppendTo[Var, x_MyEdges[[k]][[1]]MyEdges[[k]][[2]]]];
  ];
  eq == MyB[[i]],
  {i, 1, numVertex}
 ]
```

$$\{x_{15} - x_{31} - x_{41} == 7,\ x_{25} - x_{42} - x_{62} == 4,\ x_{31} + x_{34} + x_{35} - x_{63} == -1,\ -x_{34} + x_{41} + x_{42} + x_{46} - x_{54} == -7,\ -x_{15} - x_{25} - x_{35} + x_{54} - x_{65} == -2,\ -x_{46} + x_{62} + x_{63} + x_{65} == -1\}$$

```
MatrixForm[MySystem]
```

$$\begin{pmatrix} x_{15} - x_{31} - x_{41} == 7 \\ x_{25} - x_{42} - x_{62} == 4 \\ x_{31} + x_{34} + x_{35} - x_{63} == -1 \\ -x_{34} + x_{41} + x_{42} + x_{46} - x_{54} == -7 \\ -x_{15} - x_{25} - x_{35} + x_{54} - x_{65} == -2 \\ -x_{46} + x_{62} + x_{63} + x_{65} == -1 \end{pmatrix}$$

```
Var1 = Union[Var]
```

$$\{x_{15}, x_{25}, x_{31}, x_{34}, x_{35}, x_{41}, x_{42}, x_{46}, x_{54}, x_{62}, x_{63}, x_{65}\}$$

Task 5

```
Solve[MySystem, Var1]
```

Solve: Equations may not give solutions for all "solve" variables.

$$\{\{x_{41} \to -7 + x_{15} - x_{31},\ x_{54} \to x_{15} - x_{31} - x_{34} + x_{42} + x_{46},\ x_{62} \to -4 + x_{25} - x_{42},\ x_{63} \to 1 + x_{31} + x_{34} + x_{35},\ x_{65} \to 2 - x_{25} - x_{31} - x_{34} - x_{35} + x_{42} + x_{46}\}\}$$

```
Simplify[%]
```

$$\{\{x_{41} \to -7 + x_{15} - x_{31},\ x_{54} \to x_{15} - x_{31} - x_{34} + x_{42} + x_{46},\ x_{62} \to -4 + x_{25} - x_{42},\ x_{63} \to 1 + x_{31} + x_{34} + x_{35},\ x_{65} \to 2 - x_{25} - x_{31} - x_{34} - x_{35} + x_{42} + x_{46}\}\}$$