
Dunaev Viktor, 3 kurs, 6 group , Variant 23

Task I

Create.

Task 2

```
In[18]:= fname = NotebookDirectory[] <> "input.txt"
Out[18]= C:\Users\Виктор\Downloads\input.txt

In[19]:= stream = OpenRead[fname];

In[20]:= information = ReadList[stream, String]
Out[20]= { /* | 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}

In[21]:= numVertex = Read[StringToStream[StringSplit[information[[1]][[2]], Number]
Out[21]= 6

In[22]:= MyVertex = Table[i, {i, 1, numVertex}]
Out[22]= {1, 2, 3, 4, 5, 6}

In[23]:= numEdges = Read[StringToStream[StringSplit[information[[2]][[2]], Number]
Out[23]= 12

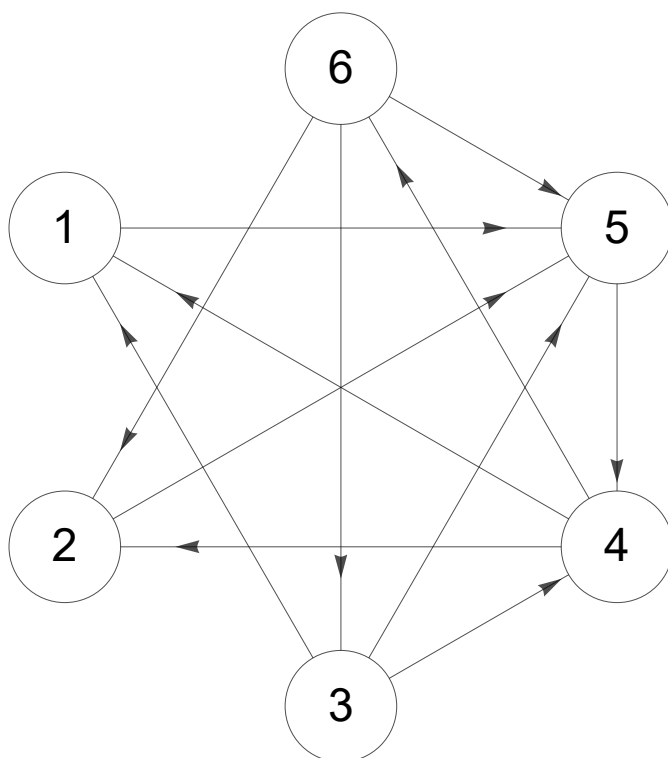
In[24]:= MyEdges = Table[
    list = StringSplit[information[[i]], {"{", "}", ","};
    Read[StringToStream[list[[1]], Number] → Read[StringToStream[list[[2]], Number],
    {i, 3, 2 + numEdges}
]
Out[24]= {1 → 5, 2 → 5, 3 → 1, 3 → 4, 3 → 5, 4 → 1, 4 → 2, 4 → 6, 5 → 4, 6 → 2, 6 → 3, 6 → 5}

In[25]:= Close[stream]
Out[25]= C:\Users\Виктор\Downloads\input.txt
```

Task 3

```
In[26]:= 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]
```

Out[26]=



Task 4

```
In[27]:= MyB = Table[
  Read[StringToStream[StringSplit[information[[i]]][2]], Number],
  {i, 3 + numEdges, Length[information]}
]
```

Out[27]= {7, 4, -1, -7, -2, -1}

```
In[28]:= MySystem = Total /@ (Subscript[x, #] & /@ Select[MyEdges, MatchQ[#, _] & /@ MyVertex] -
  Total /@ (Subscript[x, #] & /@ Select[MyEdges, MatchQ[_ -> #] & /@ MyVertex])
```

Out[28]= { $x_{1 \rightarrow 5} - x_{3 \rightarrow 1} - x_{4 \rightarrow 1}$, $x_{2 \rightarrow 5} - x_{4 \rightarrow 2} - x_{6 \rightarrow 2}$, $x_{3 \rightarrow 1} + x_{3 \rightarrow 4} + x_{3 \rightarrow 5} - x_{6 \rightarrow 3}$,
 $-x_{3 \rightarrow 4} + x_{4 \rightarrow 1} + x_{4 \rightarrow 2} + x_{4 \rightarrow 6} - x_{5 \rightarrow 4}$, $-x_{1 \rightarrow 5} - x_{2 \rightarrow 5} - x_{3 \rightarrow 5} + x_{5 \rightarrow 4} - x_{6 \rightarrow 5}$, $-x_{4 \rightarrow 6} + x_{6 \rightarrow 2} + x_{6 \rightarrow 3} + x_{6 \rightarrow 5}$ }

```
In[29]:= MySystem = (MySystem[[#]] == MyB[[#]]) & /@ MyVertex
```

Out[29]= { $x_{1 \rightarrow 5} - x_{3 \rightarrow 1} - x_{4 \rightarrow 1} == 7$, $x_{2 \rightarrow 5} - x_{4 \rightarrow 2} - x_{6 \rightarrow 2} == 4$,
 $x_{3 \rightarrow 1} + x_{3 \rightarrow 4} + x_{3 \rightarrow 5} - x_{6 \rightarrow 3} == -1$, $-x_{3 \rightarrow 4} + x_{4 \rightarrow 1} + x_{4 \rightarrow 2} + x_{4 \rightarrow 6} - x_{5 \rightarrow 4} == -7$,
 $-x_{1 \rightarrow 5} - x_{2 \rightarrow 5} - x_{3 \rightarrow 5} + x_{5 \rightarrow 4} - x_{6 \rightarrow 5} == -2$, $-x_{4 \rightarrow 6} + x_{6 \rightarrow 2} + x_{6 \rightarrow 3} + x_{6 \rightarrow 5} == -1$ }

In[30]:= **TableForm[MySystem]**

Out[30]//TableForm=

$$\begin{aligned}x_{1 \rightarrow 5} - x_{3 \rightarrow 1} - x_{4 \rightarrow 1} &= 7 \\x_{2 \rightarrow 5} - x_{4 \rightarrow 2} - x_{6 \rightarrow 2} &= 4 \\x_{3 \rightarrow 1} + x_{3 \rightarrow 4} + x_{3 \rightarrow 5} - x_{6 \rightarrow 3} &= -1 \\-x_{3 \rightarrow 4} + x_{4 \rightarrow 1} + x_{4 \rightarrow 2} + x_{4 \rightarrow 6} - x_{5 \rightarrow 4} &= -7 \\-x_{1 \rightarrow 5} - x_{2 \rightarrow 5} - x_{3 \rightarrow 5} + x_{5 \rightarrow 4} - x_{6 \rightarrow 5} &= -2 \\-x_{4 \rightarrow 6} + x_{6 \rightarrow 2} + x_{6 \rightarrow 3} + x_{6 \rightarrow 5} &= -1\end{aligned}$$

Task 5

In[31]:= **MySolve = Solve[MySystem]**

Out[31]= $\left\{ \left\{ x_{4 \rightarrow 1} \rightarrow -7 + x_{1 \rightarrow 5} - x_{3 \rightarrow 1}, x_{5 \rightarrow 4} \rightarrow x_{1 \rightarrow 5} - x_{3 \rightarrow 1} - x_{3 \rightarrow 4} + x_{4 \rightarrow 2} + x_{4 \rightarrow 6}, x_{6 \rightarrow 2} \rightarrow -4 + x_{2 \rightarrow 5} - x_{4 \rightarrow 2}, \right. \right.$
 $\left. x_{6 \rightarrow 3} \rightarrow 1 + x_{3 \rightarrow 1} + x_{3 \rightarrow 4} + x_{3 \rightarrow 5}, x_{6 \rightarrow 5} \rightarrow 2 - x_{2 \rightarrow 5} - x_{3 \rightarrow 1} - x_{3 \rightarrow 4} - x_{3 \rightarrow 5} + x_{4 \rightarrow 2} + x_{4 \rightarrow 6} \right\} \}$

In[32]:= **Simplify[MySystem /. MySolve]**

Out[32]= $\left\{ \{ \text{True}, \text{True}, \text{True}, \text{True}, \text{True}, \text{True} \} \right\}$