

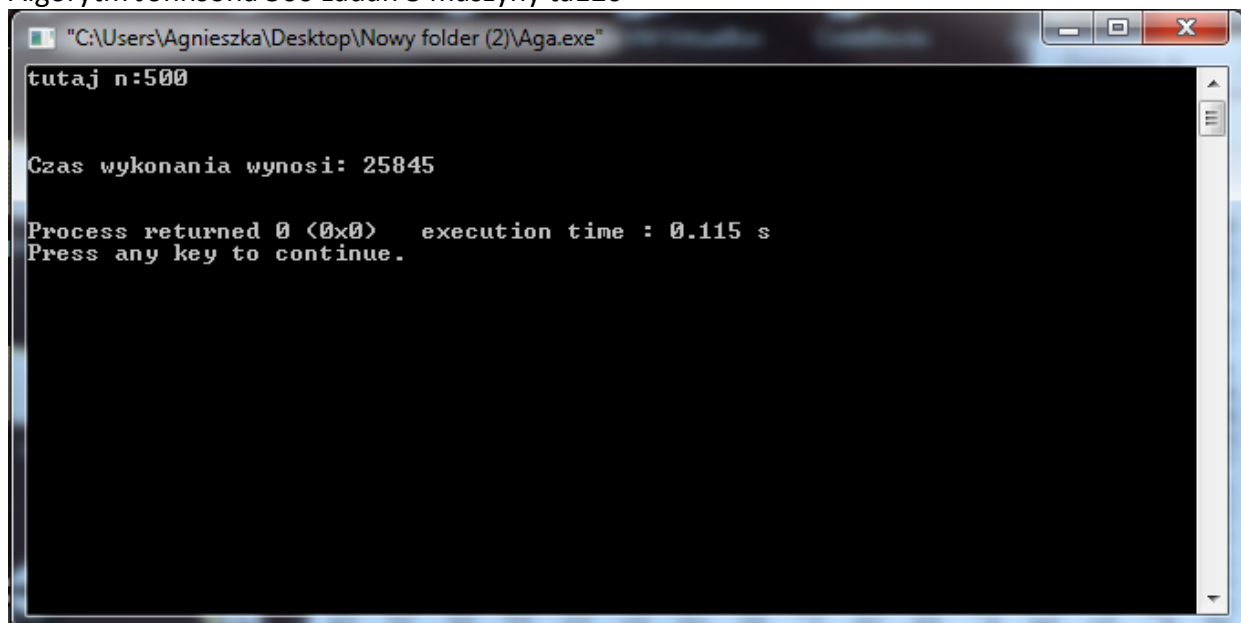
Maciej Cieśla

Agnieszka Filosek 236092

**Algorytm Johnsona** - algorytm znajdowania najkrótszych ścieżek między wszystkimi parami wierzchołków. Algorytm Johnsona zwraca albo macierz wag najkrótszych ścieżek, albo informuje, że graf wejściowy ma cykl o ujemnej wadze.

**Algorytm NEH** (Nawaz, Enscore, Ham) jest wydajnym algorytmem, który działa poprzez minimalizację czasu wykonania dla problemu przepływowego – oparty jest na technice wstawień.

Algorytm Johnsona 500 zadań 3 maszyny ta120



```
"C:\Users\Agnieszka\Desktop\Nowy folder (2)\Aga.exe"
tutaj n:500

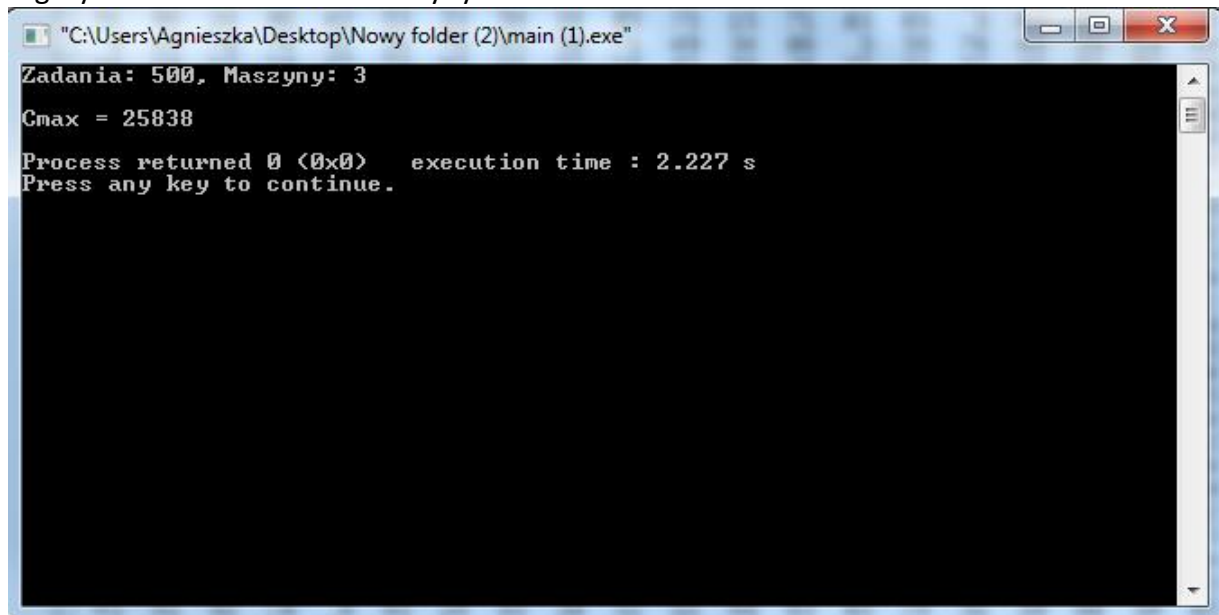
Czas wykonania wynosi: 25845

Process returned 0 (0x0)   execution time : 0.115 s
Press any key to continue.
```

$C_{MAX} = 25845$

Czas wykonania algorytmu = 0.115s

### Algorytm NEH 500 zadań 3 maszyny ta120

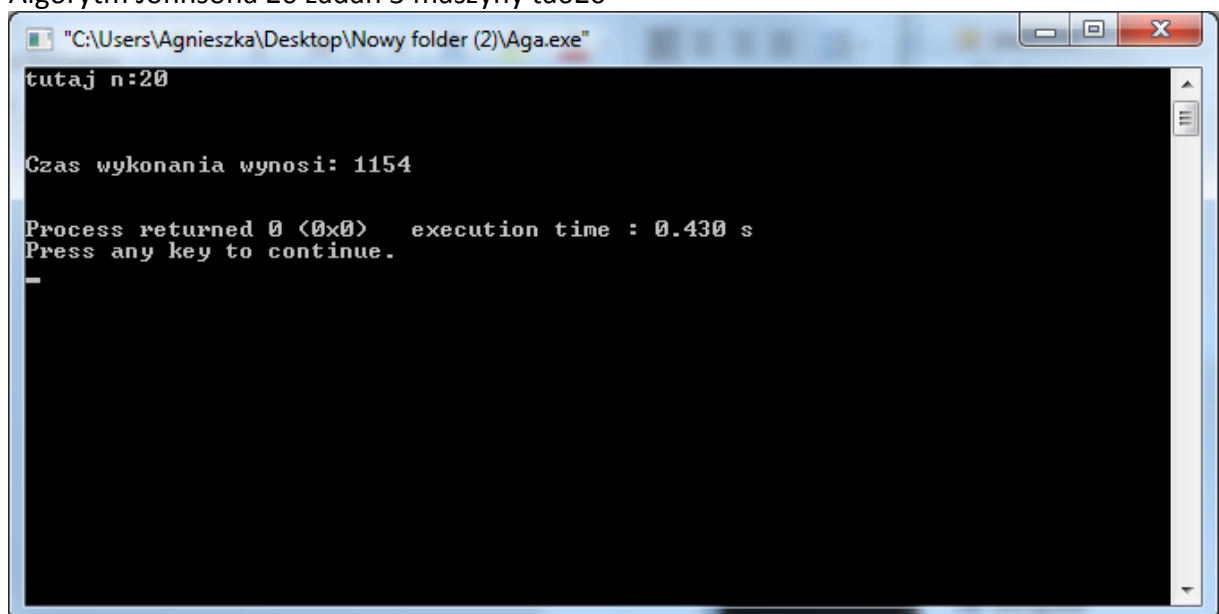


```
"C:\Users\Agnieszka\Desktop\Nowy folder (2)\main (1).exe"
Zadania: 500, Maszyny: 3
Cmax = 25838
Process returned 0 (0x0) execution time : 2.227 s
Press any key to continue.
```

C<sub>MAX</sub> = 25838

Czas wykonania algorytmu = 2.227s

### Algorytm Johnsona 20 zadań 3 maszyny ta020

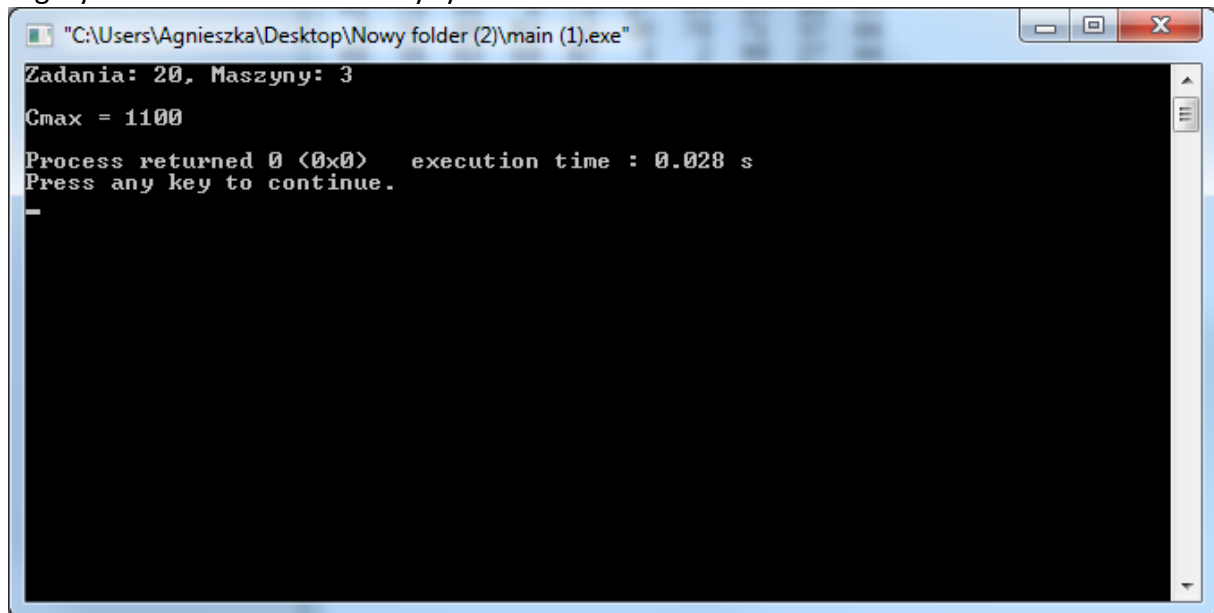


```
"C:\Users\Agnieszka\Desktop\Nowy folder (2)\Aga.exe"
tutaj n:20
Czas wykonania wynosi: 1154
Process returned 0 (0x0) execution time : 0.430 s
Press any key to continue.
```

C<sub>MAX</sub> = 1154

Czas wykonania algorytmu = 0.054s

### Algorytm NEH 20 zadań 3 maszyny ta020



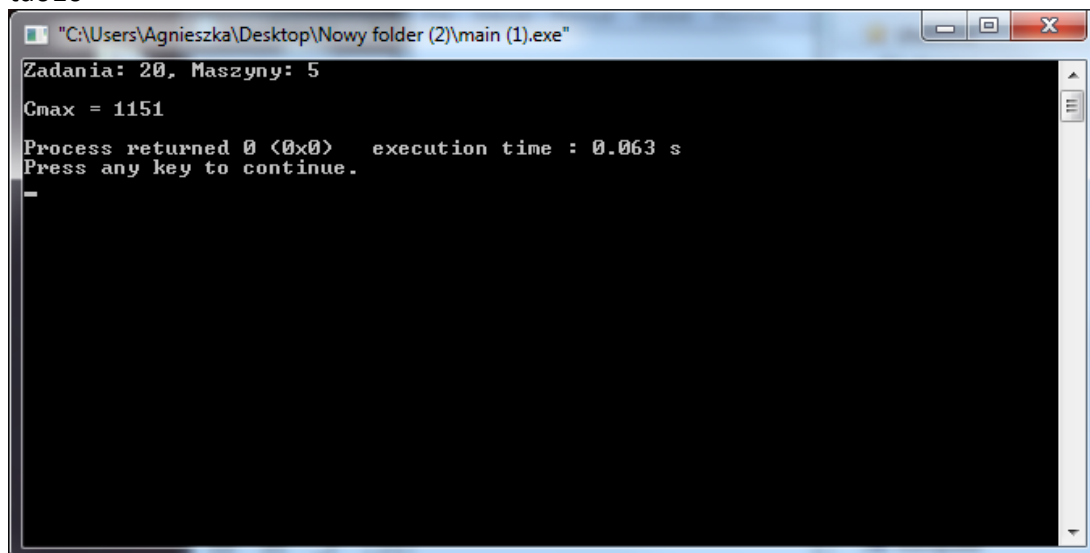
```
"C:\Users\Agnieszka\Desktop\Nowy folder (2)\main (1).exe"  
Zadania: 20, Maszyny: 3  
Cmax = 1100  
Process returned 0 (0x0)   execution time : 0.028 s  
Press any key to continue.  
-
```

C<sub>MAX</sub> = 1100

Czas wykonania algorytmu = 0.028s

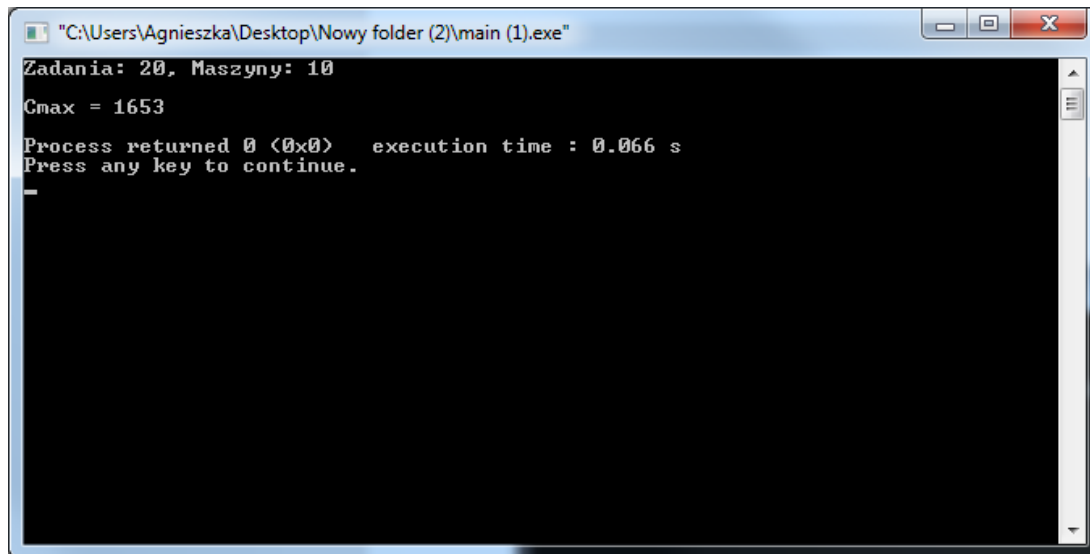
### NEH dla testowych instancji

ta010



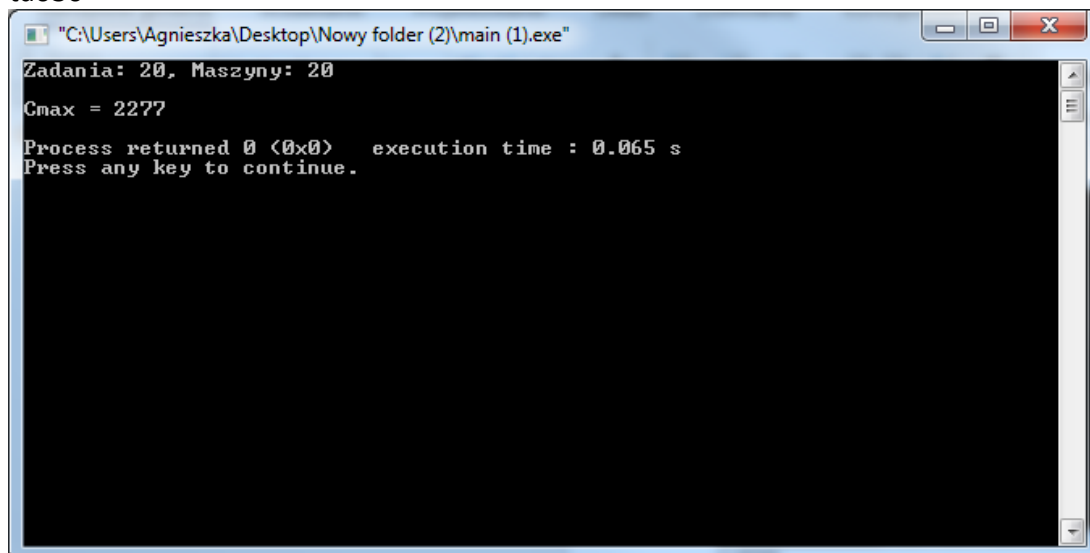
```
"C:\Users\Agnieszka\Desktop\Nowy folder (2)\main (1).exe"  
Zadania: 20, Maszyny: 5  
Cmax = 1151  
Process returned 0 (0x0)   execution time : 0.063 s  
Press any key to continue.  
-
```

ta020



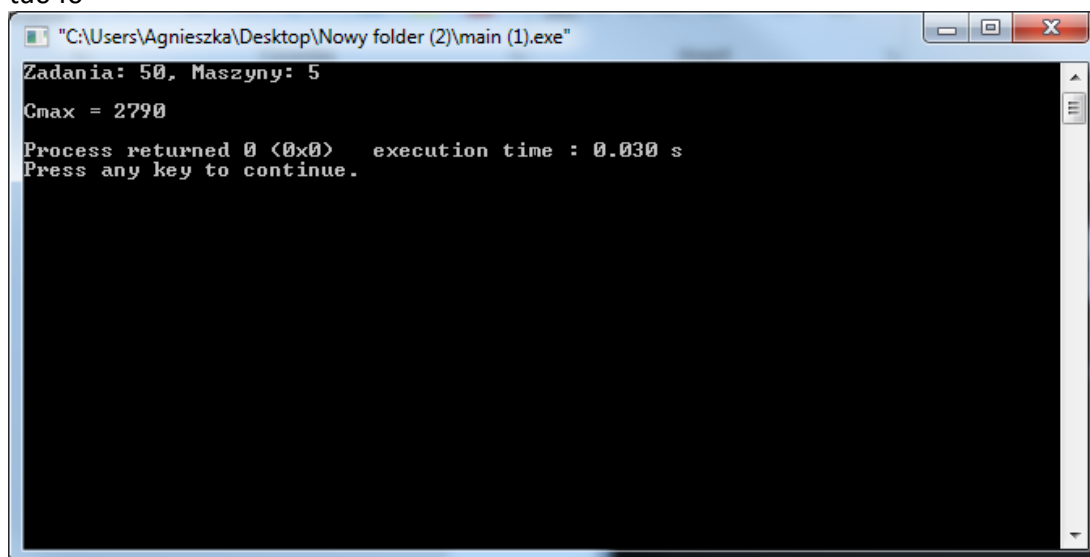
```
"C:\Users\Agnieszka\Desktop\Nowy folder (2)\main (1).exe"
Zadania: 20, Maszyny: 10
Cmax = 1653
Process returned 0 (0x0) execution time : 0.066 s
Press any key to continue.
_
```

ta030



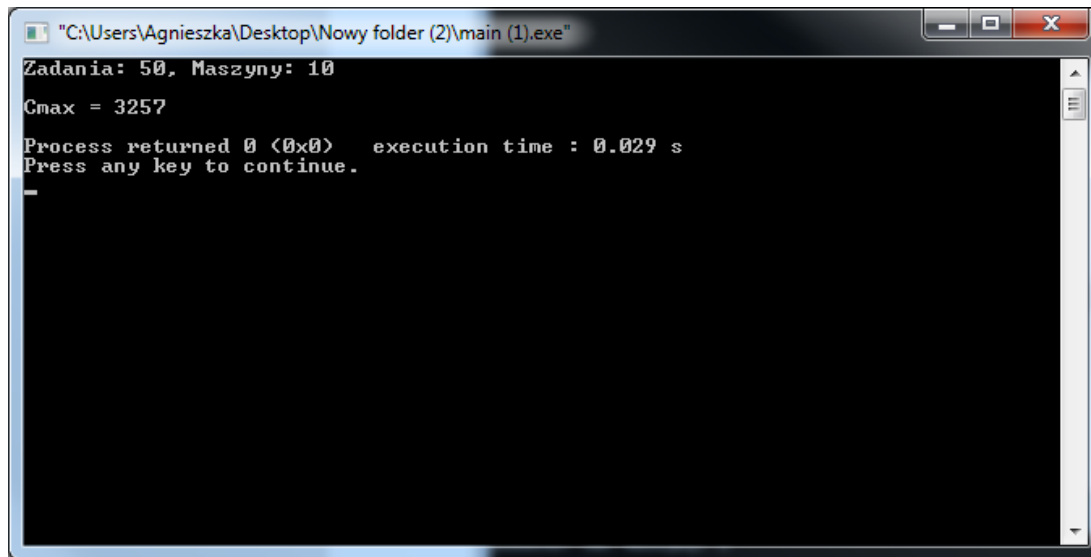
```
"C:\Users\Agnieszka\Desktop\Nowy folder (2)\main (1).exe"
Zadania: 20, Maszyny: 20
Cmax = 2277
Process returned 0 (0x0) execution time : 0.065 s
Press any key to continue.
_
```

ta040



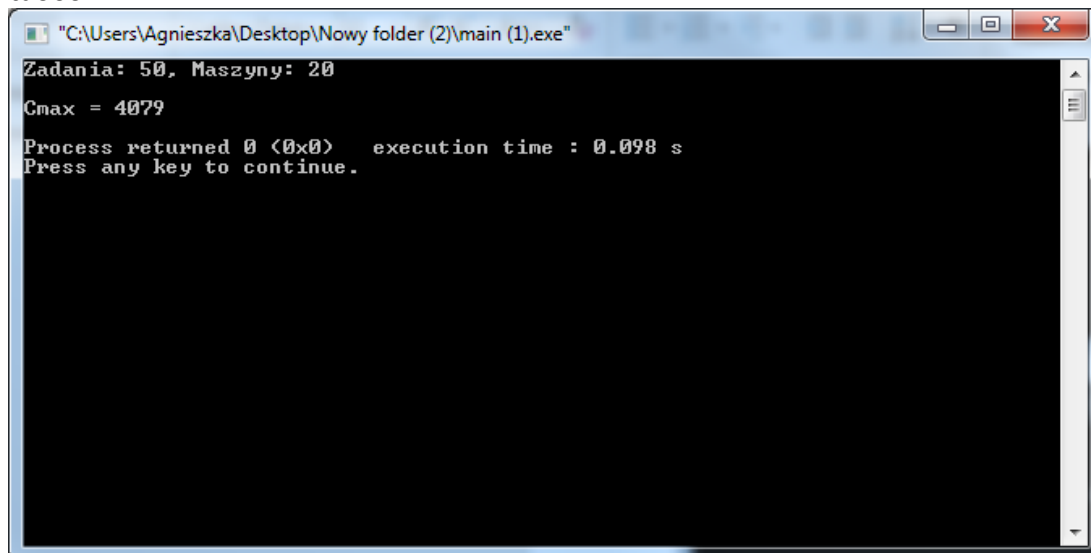
```
"C:\Users\Agnieszka\Desktop\Nowy folder (2)\main (1).exe"
Zadania: 50, Maszyny: 5
Cmax = 2790
Process returned 0 (0x0) execution time : 0.030 s
Press any key to continue.
_
```

ta050



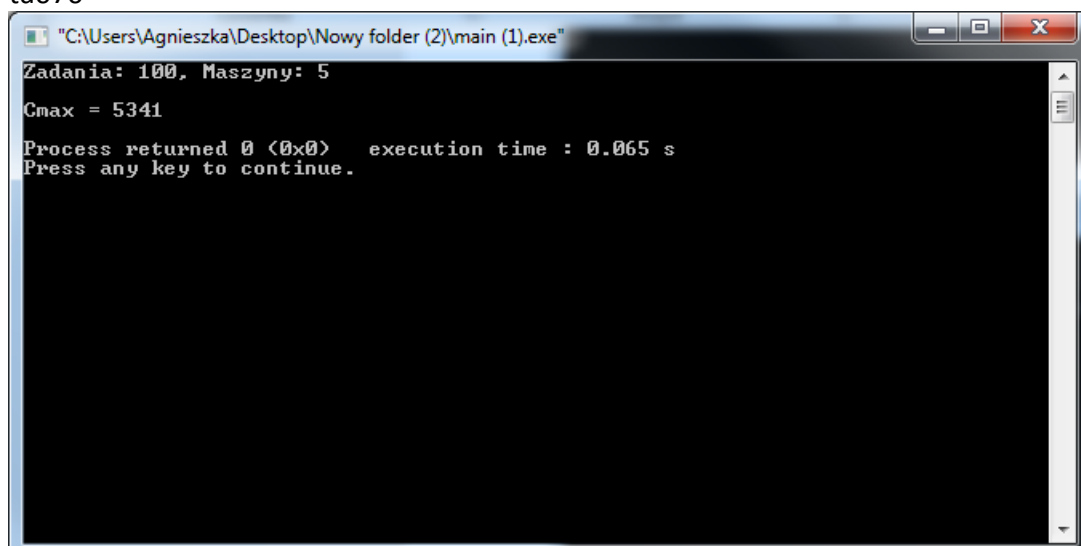
```
"C:\Users\Agnieszka\Desktop\Nowy folder (2)\main (1).exe"
Zadania: 50, Maszyny: 10
Cmax = 3257
Process returned 0 (0x0) execution time : 0.029 s
Press any key to continue.
_
```

ta060



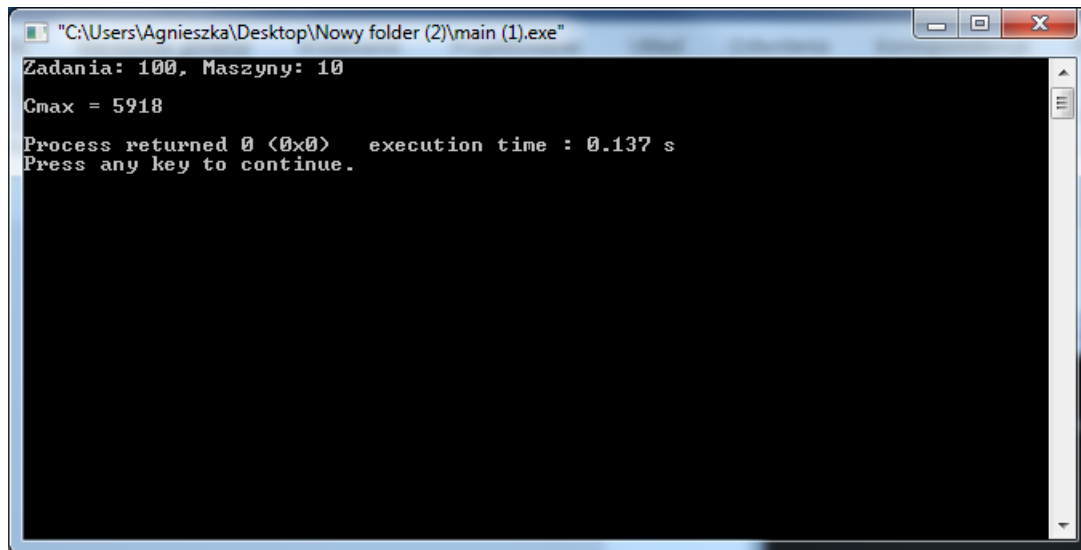
```
"C:\Users\Agnieszka\Desktop\Nowy folder (2)\main (1).exe"
Zadania: 50, Maszyny: 20
Cmax = 4079
Process returned 0 (0x0) execution time : 0.098 s
Press any key to continue.
```

ta070



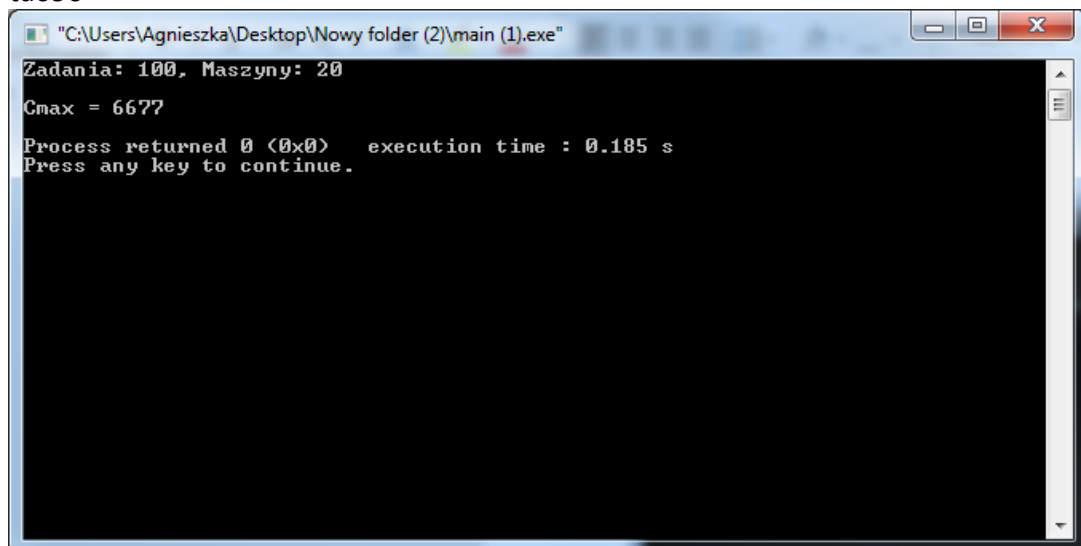
```
"C:\Users\Agnieszka\Desktop\Nowy folder (2)\main (1).exe"
Zadania: 100, Maszyny: 5
Cmax = 5341
Process returned 0 (0x0) execution time : 0.065 s
Press any key to continue.
```

ta080



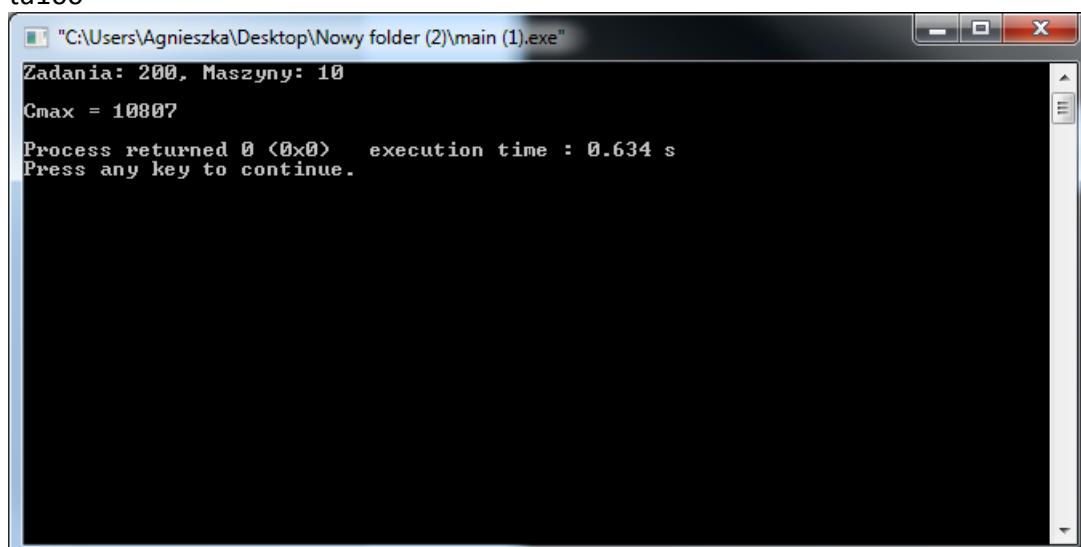
```
"C:\Users\Agnieszka\Desktop\Nowy folder (2)\main (1).exe"
Zadania: 100, Maszyny: 10
Cmax = 5918
Process returned 0 (0x0) execution time : 0.137 s
Press any key to continue.
```

ta090



```
"C:\Users\Agnieszka\Desktop\Nowy folder (2)\main (1).exe"
Zadania: 100, Maszyny: 20
Cmax = 6677
Process returned 0 (0x0) execution time : 0.185 s
Press any key to continue.
```

ta100



```
"C:\Users\Agnieszka\Desktop\Nowy folder (2)\main (1).exe"
Zadania: 200, Maszyny: 10
Cmax = 10807
Process returned 0 (0x0) execution time : 0.634 s
Press any key to continue.
```

ta110

```

"C:\Users\Agnieszka\Desktop\Nowy folder (2)\main (1).exe"
Zadania: 200, Maszyny: 20
Cmax = 11869
Process returned 0 (0x0)   execution time : 1.077 s
Press any key to continue.

```

ta120

```

"C:\Users\Agnieszka\Desktop\Nowy folder (2)\main (1).exe"
Zadania: 500, Maszyny: 20
Cmax = 26984
Process returned 0 (0x0)   execution time : 14.254 s
Press any key to continue.
-

```

NEH z akceleracją dla wszystkich instancji

C <sub>MAX</sub>	Czas algorytmu (ms)
------------------	---------------------------

32	0.000043	1502	0.000202	2277	0.000398	3160	0.000959	4079	0.002037
1286	0.00124	1453	0.000229	2733	0.000521	3178	0.000998	5519	0.001854
1365	0.000117	1562	0.000204	2843	0.000512	3277	0.001071	5348	0.001868
1159	0.000115	1609	0.000206	2640	0.000509	3123	0.001020	5219	0.001849
1325	0.000176	1647	0.000194	2782	0.000493	3002	0.000975	5023	0.001822
1305	0.000113	1653	0.000201	2868	0.000507	3257	0.000977	5266	0.001798
1228	0.000196	2410	0.000335	2850	0.000678	4082	0.001955	5139	0.002038
1278	0.000122	2150	0.000340	2758	0.000510	3921	0.001921	5259	0.001853
1223	0.000121	2411	0.000340	2721	0.000548	3927	0.001937	5120	0.001900
1291	0.000116	2262	0.000334	2576	0.000510	3969	0.001879	5489	0.002284
1151	0.000127	2397	0.000344	2790	0.000490	3835	0.001859	5341	0.001838
1680	0.000208	2349	0.000351	3135	0.000960	3914	0.001897	5846	0.003532
1729	0.000199	2362	0.000328	3032	0.000972	3952	0.001892	5453	0.003574
1557	0.000202	2249	0.000345	2986	0.001023	3938	0.002150	5824	0.003852
1439	0.000213	2320	0.000350	3198	0.000987	3952	0.001910	5929	0.003528

5679	0.003634	6632	0.007040	10574	0.013135	26670	0.155307
5375	0.003483	6739	0.007371	10807	0.014104	27232	0.155931
5704	0.003638	6677	0.007037	11594	0.030567	26848	0.157739
5760	0.004206	6677	0.007483	11675	0.030924	27055	0.158057
6032	0.003650	10942	0.013440	11852	0.037133	26727	0.169376
5918	0.003720	10716	0.013347	11803	0.039382	26992	0.167990
6541	0.007161	11025	0.013341	11685	0.036381	26797	0.163635
6523	0.007299	11057	0.013395	11629	0.030493	27138	0.162678
6639	0.007912	10645	0.013313	11833	0.030588	26631	0.159859
6557	0.007240	10458	0.013285	11913	0.032021		
6695	0.007064	10989	0.013440	11673	0.038829		
6664	0.007290	10829	0.013086	11869	0.027370		

## Wnioski

W przypadku algorytmu NEH wartość  $C_{MAX}$  była niższa niż dla algorytmu Johnsona. Czas wykonywania algorytmu Johnsona był krótszy od czasu wykonywania algorytmu NEH. Akceleracja znacznie poprawiła szybkość działania algorytmu NEH.