Лабораторная работа № 1

по дисциплине «Алгоритмы и структуры данных»

Openedu – неделя 1

Подготовил:

студент группы P3217

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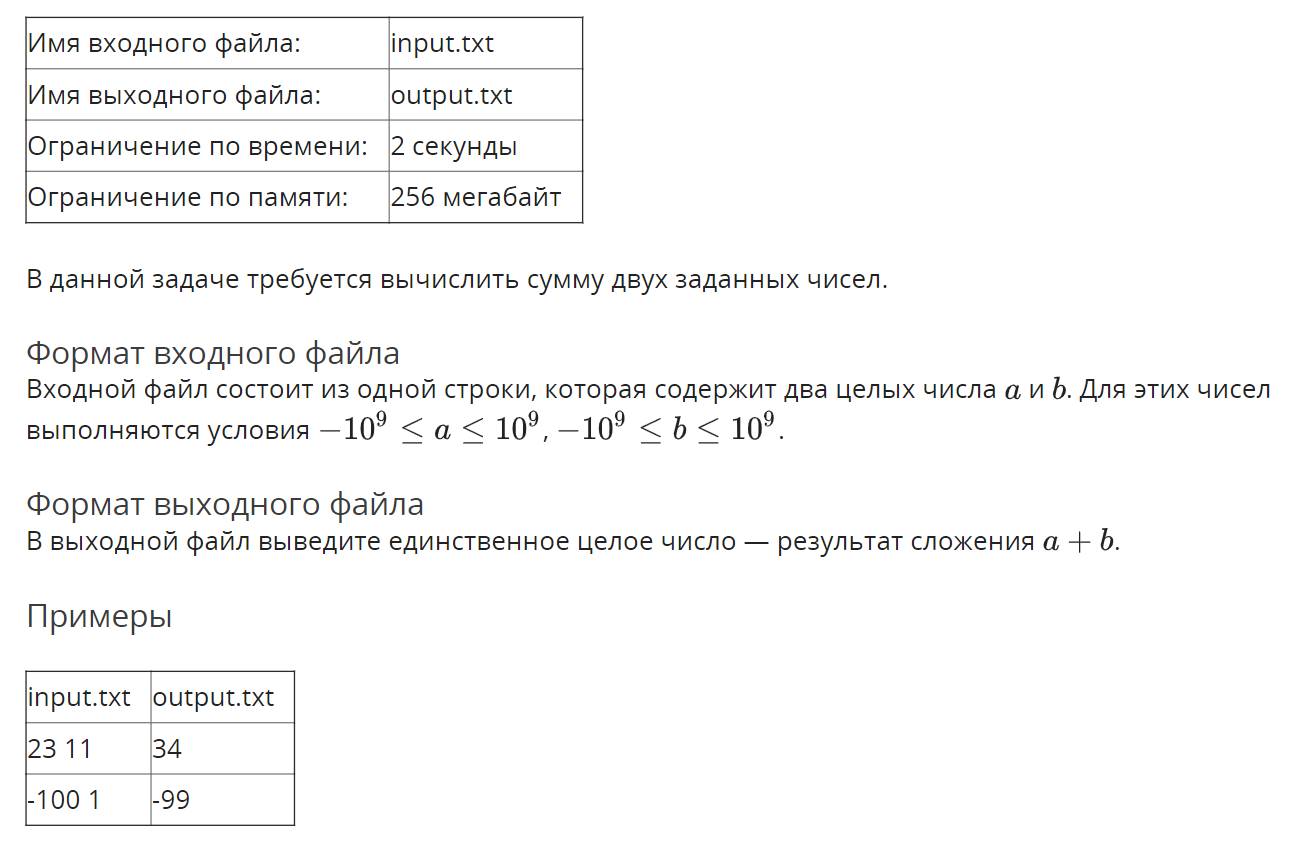
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Волчек Дмитрий Геннадьевич

# Задача «a+b»

## Условие



## Решение

openedu/week1/lab1\_1.py

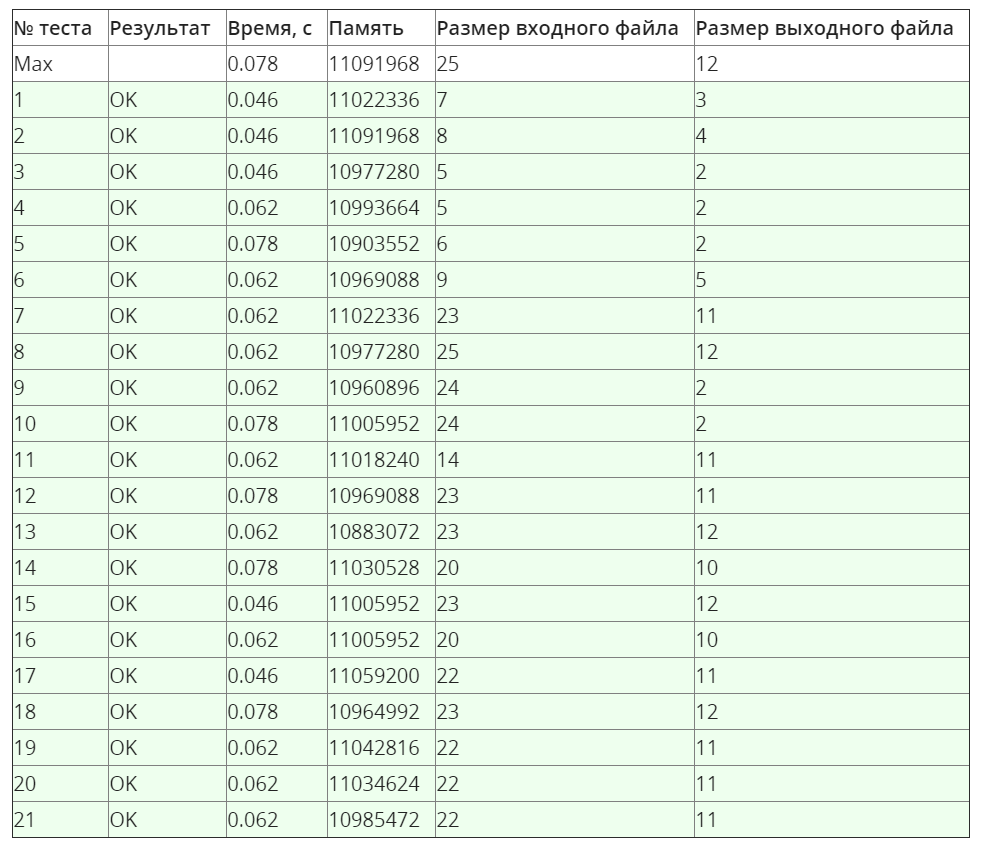
from edx\_io import edx\_io

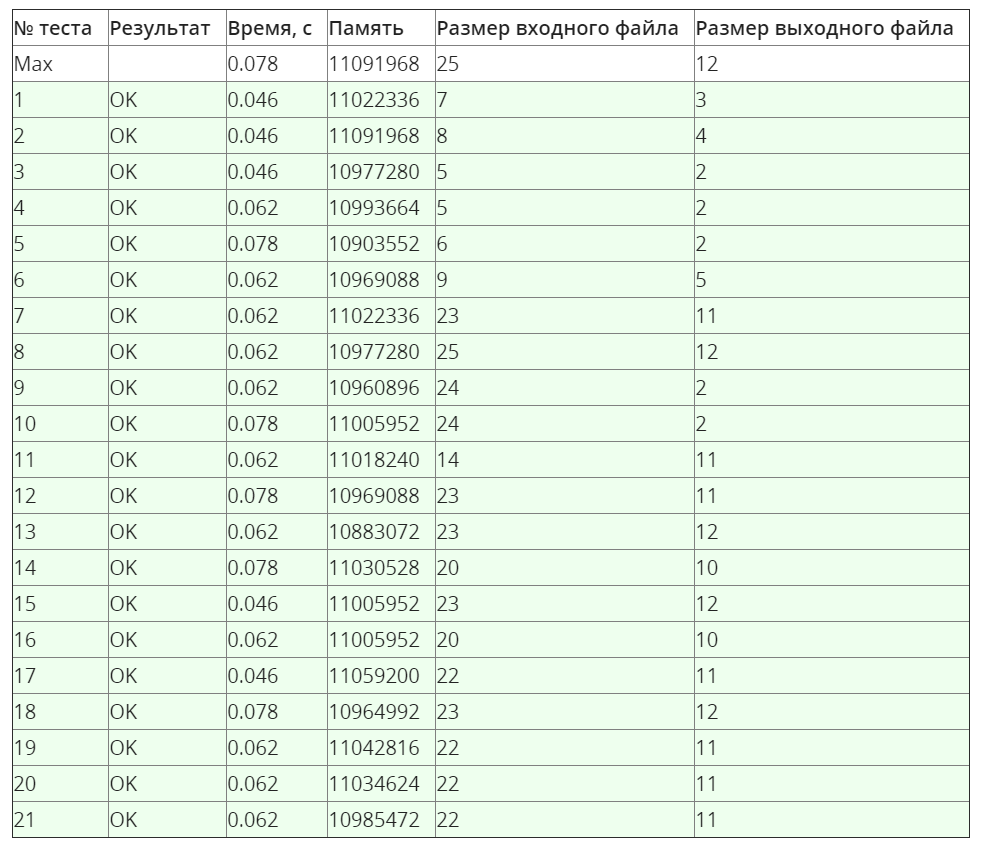
# testing official course io wrapper for Python

with edx\_io() as io:

io.writeln(io.next\_int() + io.next\_int())

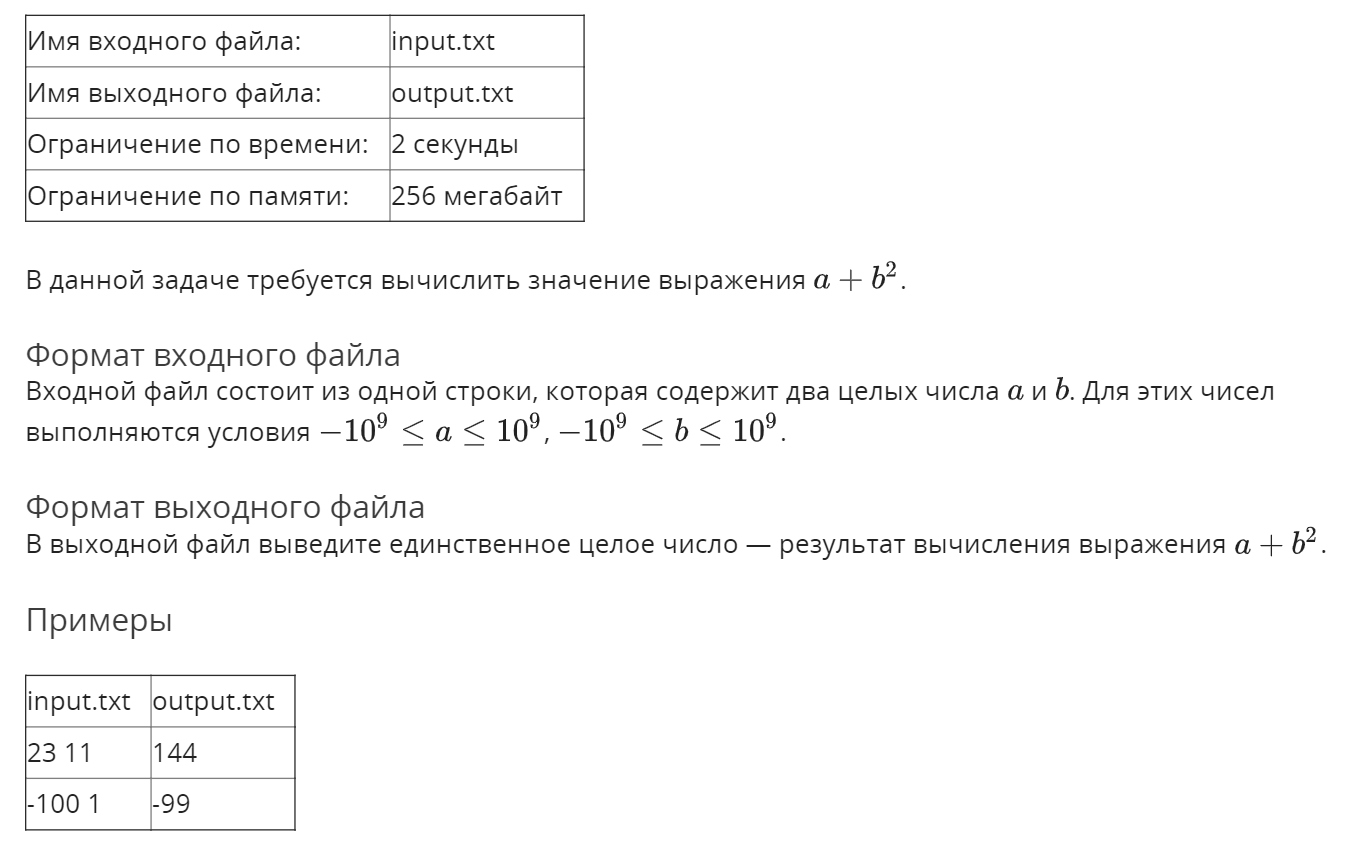
## Результаты





# Задача «a+b^2»

## Условие



## Решение

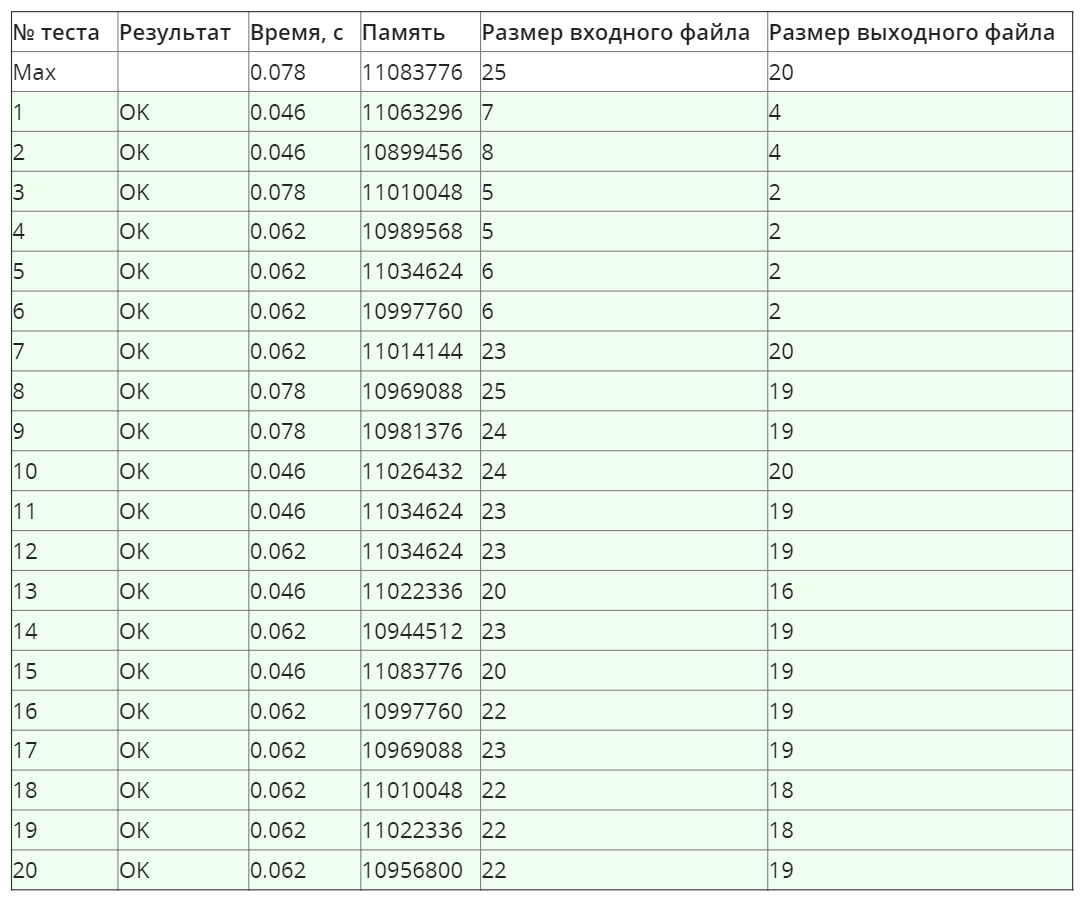
openedu/week1/lab1\_2.py

from edx\_io import edx\_io

with edx\_io() as io:

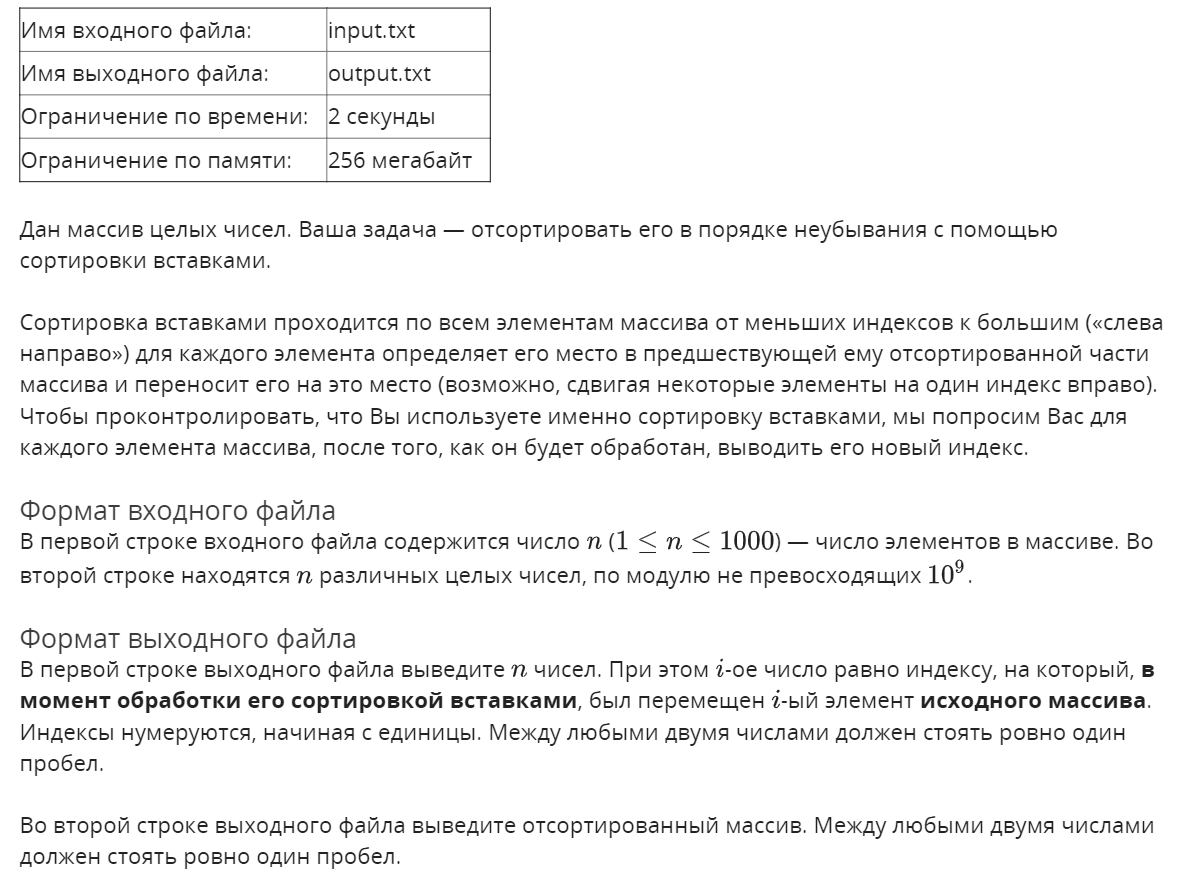
io.writeln(io.next\_int() + io.next\_int() \*\* 2)

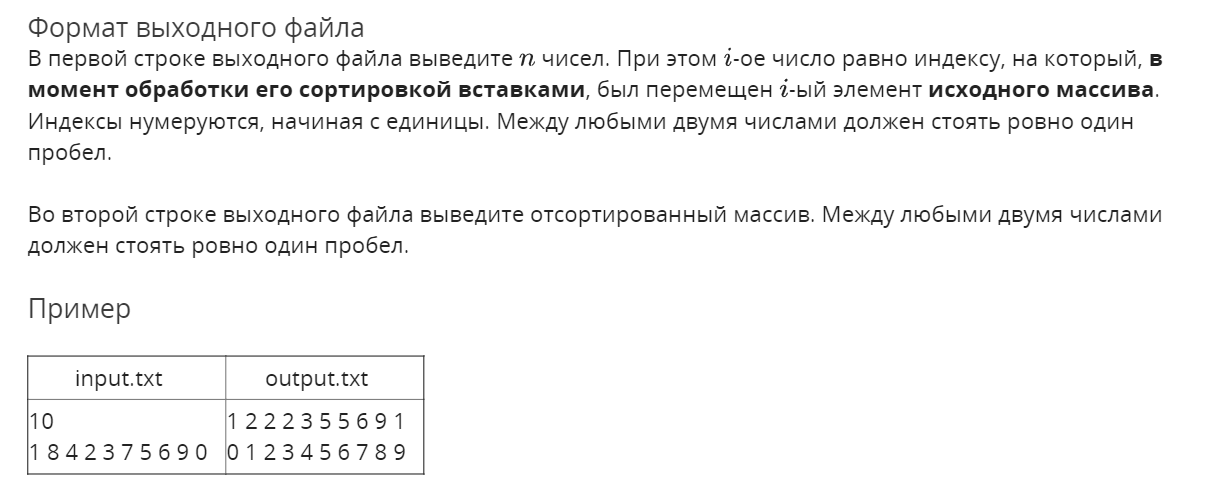
## Результаты



## Сортировка вставками

## Условие





## Решение

openedu/week1/lab1\_3.py

from edx\_io import edx\_io

with edx\_io() as io:

# read input

n = io.next\_int()

arr = [io.next\_int() for i in range(n)]

# list for saving intermediate indices

indices = []

# perform soring

for i in range(n):

for j in range(i - 1, -1, -1):

if arr[j] > arr[j+1]:

# if the order is wrong, swap 'em all!

arr[j], arr[j+1] = arr[j+1], arr[j]

else:

# else remember the index or the inserted element, as requested

# need j+1, indexing from 1

indices.append(j + 2)

# and go for inserting the next element

break

else:

# if we reached the beginning, put 1 as index

indices.append(1)

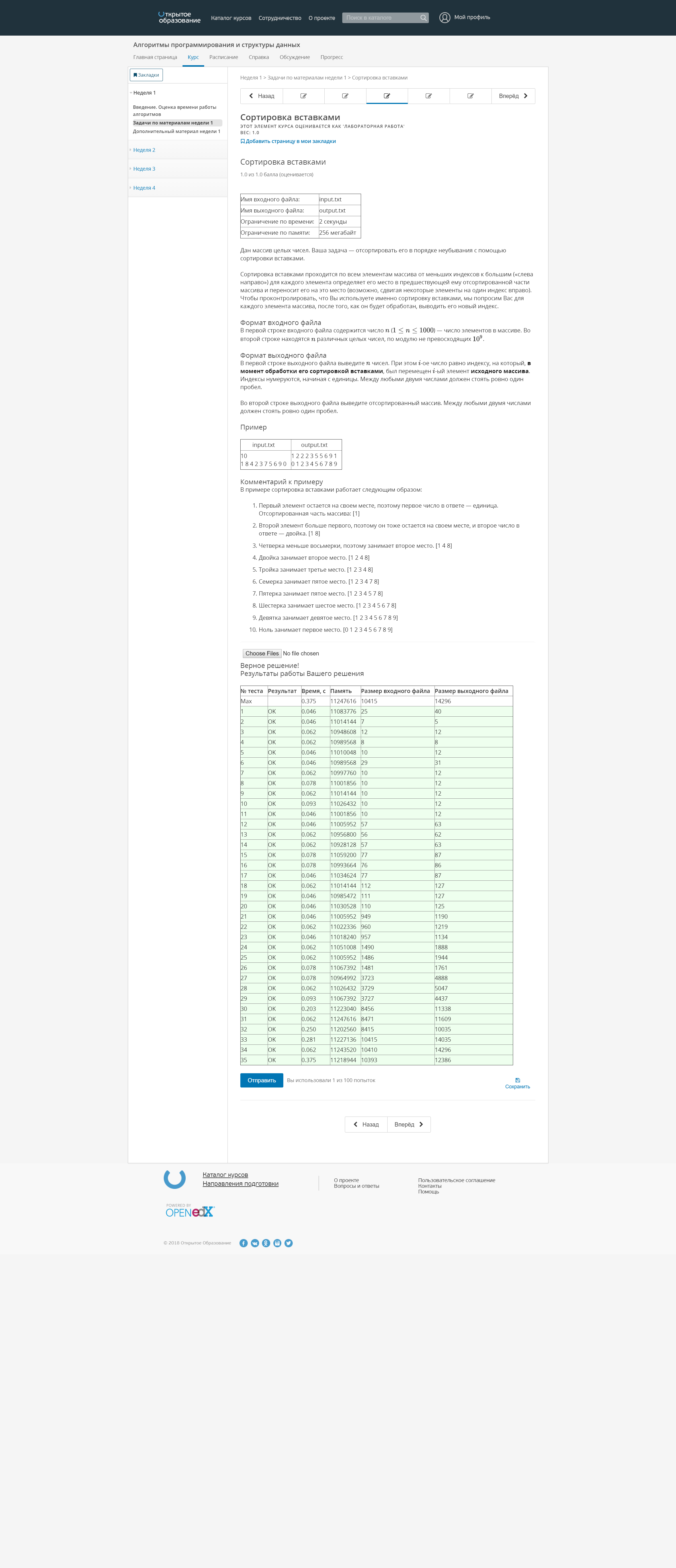
# write results

io.writeln(indices)

io.writeln(arr)

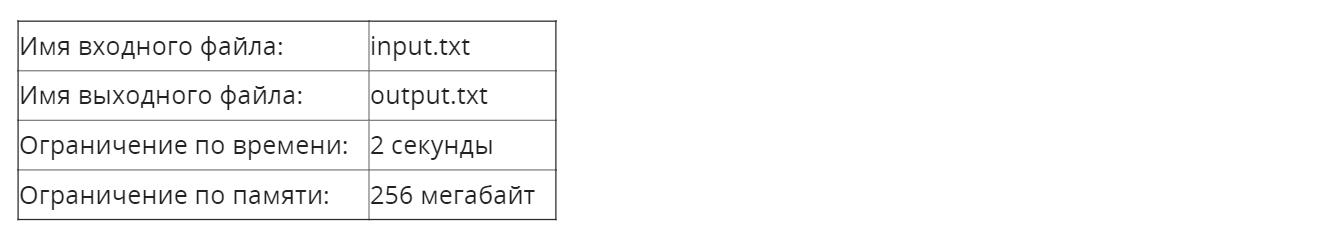
## Результаты

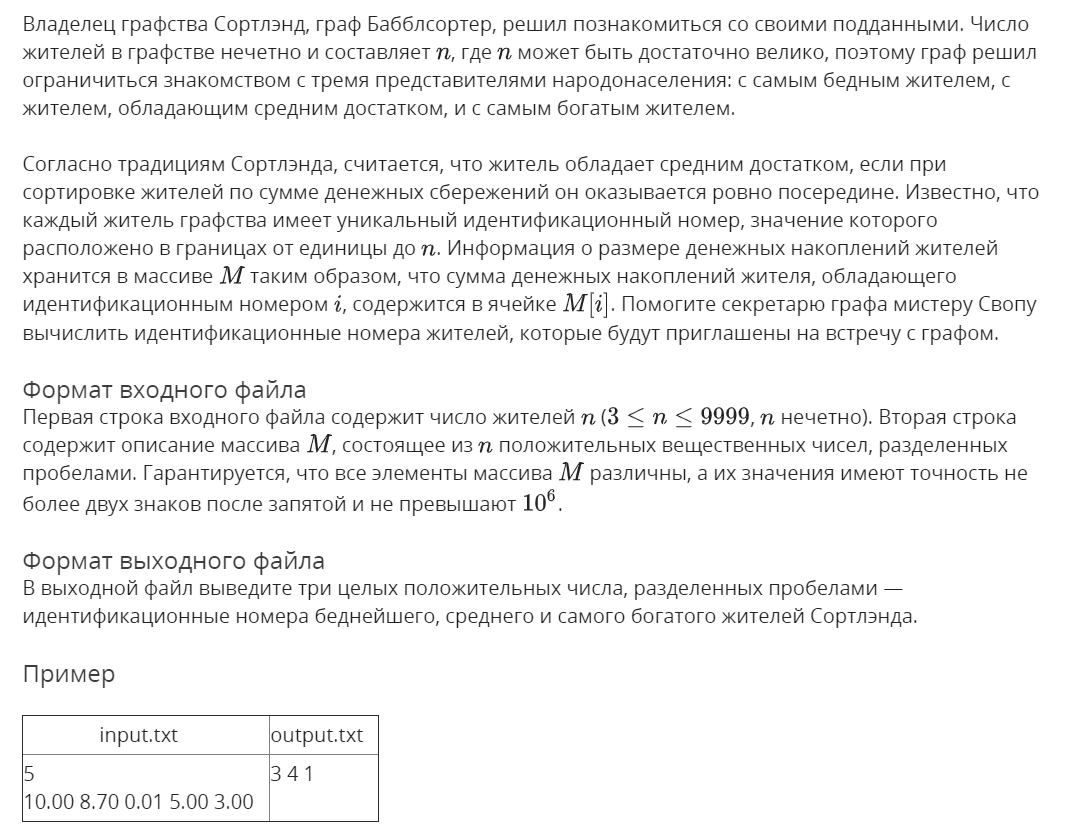




## Знакомство с жителями Сортлэнда

## Условие





## Решение

openedu/week1/lab1\_4.py

from edx\_io import edx\_io

with edx\_io() as io:

# read input

n = io.next\_int()

incomes = [(io.next\_float(), i + 1) for i in range(n)]

# perform sorting

# I tried Insertion Sort, even with Cython optimizations - time limit exceeded :(

# bad time or variable limits, imo

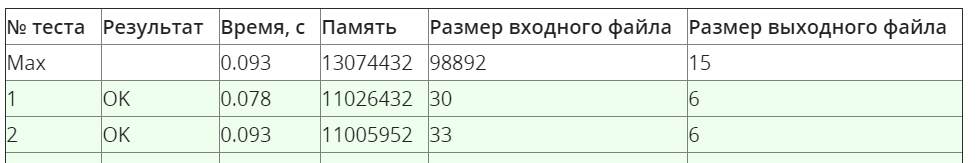
# thus using stable O(nlogn) sort here, they deserve it

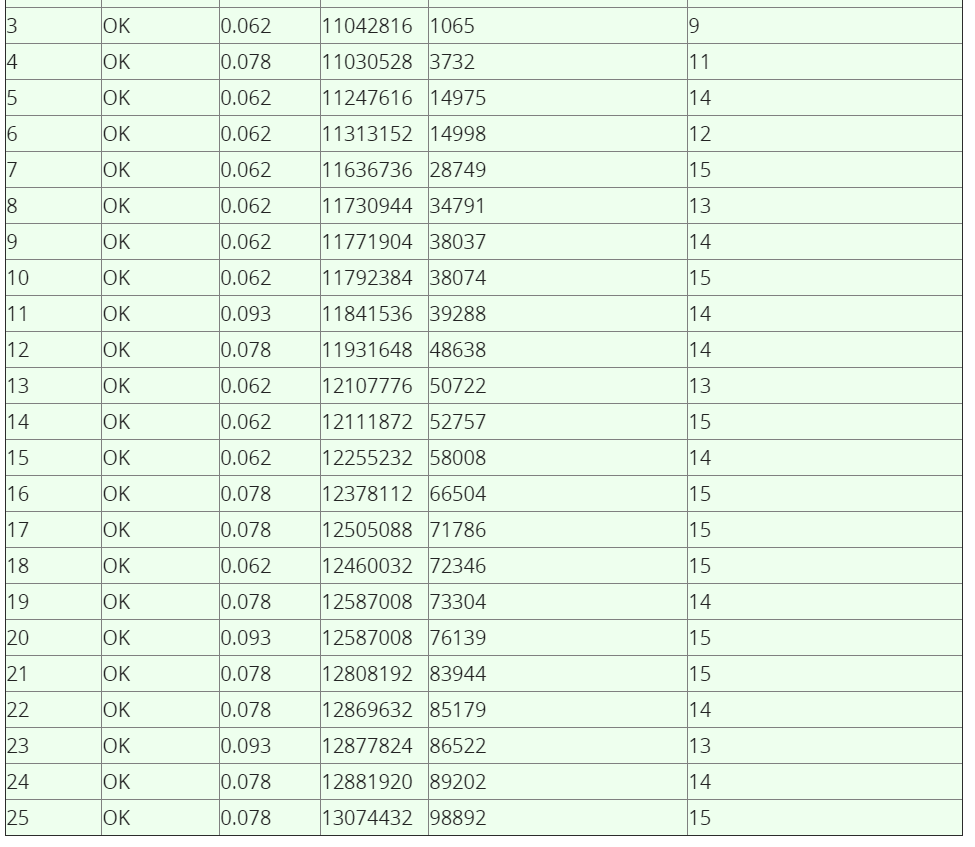
incomes.sort()

# write results

io.writeln((incomes[0][1], incomes[n // 2][1], incomes[-1][1]))

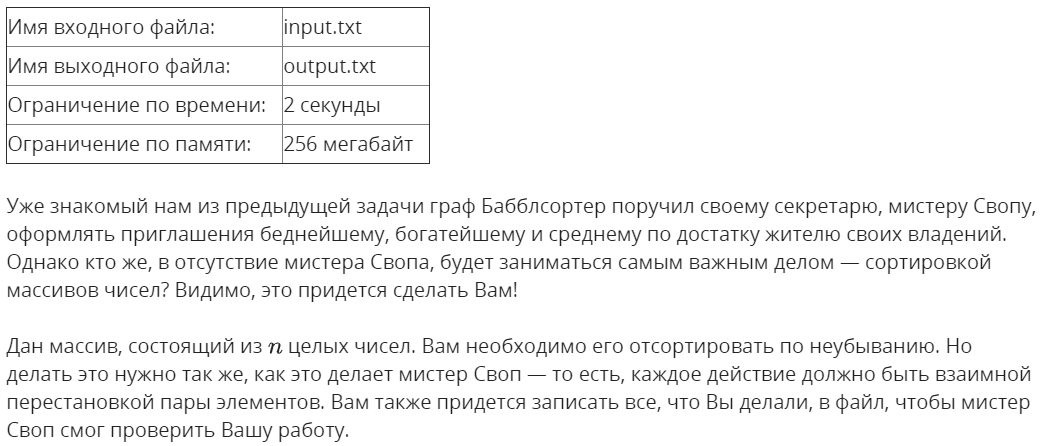
## Результаты

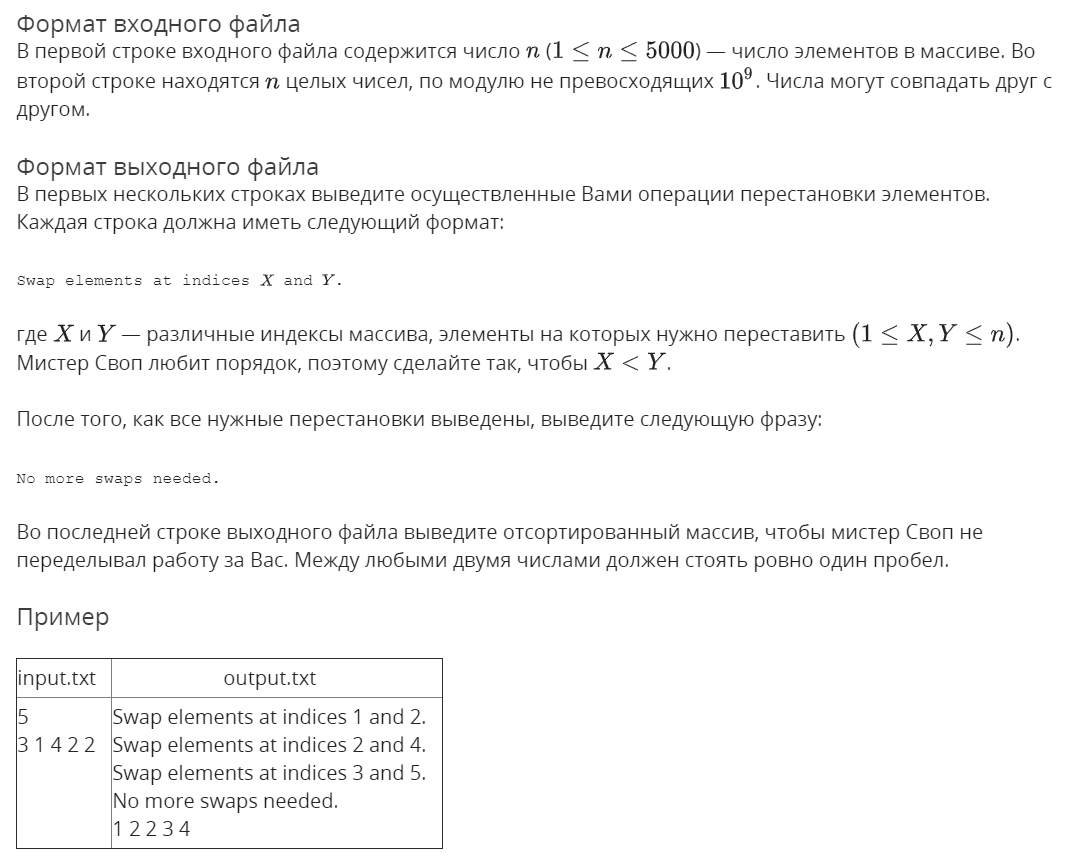




## Секретарь Своп

## Условие





## Решение

openedu/week1/lab1\_5.py

from edx\_io import edx\_io

with edx\_io() as io:

# read input

n = io.next\_int()

incomes = [io.next\_int() for i in range(n)]

# perform sorting swaps not to bloat io (selection sort)

for i in range(n - 1):

# find min value and its index

mi = incomes.index(min(incomes[i:]), i)

# swap current and min

if mi != i:

incomes[mi], incomes[i] = incomes[i], incomes[mi]

io.writeln(f"Swap elements at indices {i + 1} and {mi + 1}.")

# write results

io.writeln("No more swaps needed.")

io.writeln(incomes)

## Результаты

