Rectangles (advanced)

Submission deadline:	**2023-10-30 11:59:59**	1385476.247 sec
Late submission with malus:	**2023-12-31 23:59:59** (Late submission malus: 100.0000 %)	
Evaluation:	**5.5000**	
Max. assessment:	**5.0000** (Without bonus points)	
Submissions:	5 / 20 Free retries + 10 Penalized retries (-10 % penalty each retry)	
Advices:	4 / 2 Advices for free + 2 Advices with a penalty (-10 % penalty each advice)	

The task is to develop a program which decides whether four given points form a rectangle.

The input of the program are four points in a 2D plane. Point are given as two **decimal** numbers - the `x` and `y` coordinates. The order of input shall respect the border of the rectangle. If the points form a rectangle, however the order is shuffled, the program shall answer negative (see the last-but-one sample below).

The output of the program is a decision whether the input points form a rectangle, or not. The output is a single line (see format in sample runs below) followed by a newline (\n). For the purpose of this program, squares are considered rectangles (they indeed are special cases of rectangles).

The program must validate input data. If the input is invalid, the program detects it, it outputs an error message and terminates. If displayed, the error message must be displayed on the standard output (do not send it to the error output) and the error message must be terminated by a newline (\n). The input is considered invalid, if:

- a coordinate is invalid (non-numeric),
- a separator is missing or is invalid (parentheses, comma), or
- a coordinate is missing.

Please strictly adhere the format of the output. The output must exactly match the output of the reference program. The comparison is done by a machine, the machine requires an exact match. If your program provides output different from the reference, the program is considered malfunctioning. Be very careful, the machine is sensitive event to whitespace characters (spaces, newlines, tabulators). Please note that all output lines are followed by a newline character (\n). This applies even to the last line of the output, moreover, this applies even to the error message. Download the enclosed archive. The archive contains a set of testing inputs and the expected outputs. Use the attached files to simplify the testing of your programs.

Your program will be tested in a restricted environment. The testing environment limits running time and available memory. The exact time and memory limits are shown in the reference solution testing log. However, neither time nor memory limit could cause a problem in this simple program.

Example program runs:

```
Point #1:
(0,0)
Point #2:
(20,0)
Point #3:
(20,50)
Point #4:
(0,50)
The points form a rectangle.
```

```
Point #1:
( -10.5 , 15.8 )
Point #2:
(178.23,15.8)
Point #3:
( 178.23, -67.2)
Point #4:
(-10.5, -67.2)
```

The points form a rectangle.

Point #1:
(0,-4)
Point #2:
(4, 0)
Point #3:
(0, 4)
Point #4:
(-4, 0)
The points form a rectangle.

Point #1:
(0, -4)
Point #2:
(4, 0)
Point #3:
(0, 4)
Point #4:
(-6, 0)
The points do not form a rectangle.

Point #1:
(0, 0)
Point #2:
(20, 0)
Point #3:
(0, 50)
Point #4:
(20, 50)
The points do not form a rectangle.

Point #1:
(61494, 576)
Point #2:
(865814, 31074)
Point #3:
(804818, 1639714)
Point #4:
(498, 1609216)
The points form a rectangle.

Point #1:
(6149.4, 57.6)
Point #2:
(86581.4, 3107.4)
Point #3:
(80481.8, 163971.4)
Point #4:
(49.8, 160921.6)
The points form a rectangle.

Point #1:
(50, 50)
Point #2:
(35, test)
Invalid input.

Point #1:

```
10,20
Invalid input.
```

Advice:

- The sample runs above list both the output of your program (boldface font) and user input (regular font). The bold/regular formatting is included here, in the problem statement page, to increase readability of the listing. Your program must output the text without any additional markup.
- Do not forget the newline (\n) after the last output line.
- This problem is an extension of the simpler integer-only problem. We recommend you to start with the integer version. When the simpler program works, extend it to use decimal inputs.

Sample data:		**Download**
Submit:	Выбрать файл	**Submit**

☐ **Reference**

5	**2023-10-14 10:06:59**	**Download**
Submission status:	Evaluated	
Evaluation:	5.5000	

- **Evaluator: computer**
  - Program compiled
  - Test 'Basic test with example input data': success
    - result: 100.00 %, required: 100.00 %
    - Max. run time: 0.007 s (limit: 1.000 s)
    - Total run time: 0.058 s
    - Mandatory test success, evaluation: 100.00 %
  - Test 'Borderline test': success
    - result: 100.00 %, required: 50.00 %
    - Max. run time: 0.007 s (limit: 1.000 s)
    - Total run time: 0.375 s
    - Optional test success, evaluation: 100.00 %
  - Test 'Invalid input data test': success
    - result: 100.00 %, required: 50.00 %
    - Max. run time: 0.006 s (limit: 1.000 s)
    - Total run time: 0.181 s
    - Optional test success, evaluation: 100.00 %
  - Test 'Random test': success
    - result: 100.00 %, required: 50.00 %
    - Max. run time: 0.006 s (limit: 1.000 s)
    - Total run time: 0.234 s
    - Optional test success, evaluation: 100.00 %
  - Overall ratio: 100.00 % (= 1.00 * 1.00 * 1.00 * 1.00)
- Advices used: 2
- Penalty due to advices: None (2 <= 2 limit)
- Total percent: 100.00 %
- Early submission bonus: 0.50
- Total points: 1.00 * (5.00 + 0.50) = 5.50

SW metrics:

	Total	Average	Maximum	Function name
Functions:	**6**	--	--	--
Lines of code:	**52**	**8.67 ± 10.93**	**33**	`main`
Cyclomatic complexity:	**15**	**2.50 ± 3.35**	**10**	`main`

4	**2023-10-14 09:53:31**	**Download**
Submission status:	Evaluated	

Evaluation: 5.2381

- **Evaluator: computer**
  - Program compiled
  - Test 'Basic test with example input data': success
    - result: 100.00 %, required: 100.00 %
    - Max. run time: 0.007 s (limit: 1.000 s)
    - Total run time: 0.056 s
    - Mandatory test success, evaluation: 100.00 %
  - Test 'Borderline test': success
    - result: 95.24 %, required: 50.00 %
    - Max. run time: 0.007 s (limit: 1.000 s)
    - Total run time: 0.376 s
    - Optional test success, evaluation: 95.24 %
    - Failed (invalid output)
    - ☑ Failed (invalid output)
      - ☑ Input data **[94 B / 94 B]**

```
(3.2168e93, 0.0777e93)
(11.2664e93, 4.3005e93)
(8.0993e93, 10.3377e93)
(0.0497e93, 6.1149e93)
```

      - ☑ Output data **[76 B / 76 B]**

```
Point #1:
Point #2:
Point #3:
Point #4:
The points do not form a rectangle.
```

      - ☑ Reference **[69 B / 69 B]**

```
Point #1:
Point #2:
Point #3:
Point #4:
The points form a rectangle.
```

    - ☑ Failed (invalid output)
      - ☑ Input data **[92 B / 92 B]**

```
(0.6846e94, 0.0949e94)
(1.9574e94, 1.3003e94)
(1.3547e94, 1.9367e94)
(0.0819e94, 0.7313e94)
```

      - ☑ Output data **[76 B / 76 B]**

```
Point #1:
Point #2:
Point #3:
Point #4:
The points do not form a rectangle.
```

      - ☑ Reference **[69 B / 69 B]**

```
Point #1:
Point #2:
Point #3:
Point #4:
The points form a rectangle.
```

- Test 'Invalid input data test': success
  - result: 100.00 %, required: 50.00 %
  - Max. run time: 0.011 s (limit: 1.000 s)
  - Total run time: 0.207 s
  - Optional test success, evaluation: 100.00 %
- Test 'Random test': success
  - result: 100.00 %, required: 50.00 %
  - Max. run time: 0.007 s (limit: 1.000 s)
  - Total run time: 0.247 s
  - Optional test success, evaluation: 100.00 %
- Overall ratio: 95.24 % (= 1.00 * 0.95 * 1.00 * 1.00)

- Advices used: 1
- Penalty due to advices: None (1 <= 2 limit)
- Total percent: 95.24 %
- Early submission bonus: 0.50
- Total points: 0.95 * (5.00 + 0.50) = 5.24

		Total	Average	Maximum	Function name
SW metrics:	Functions:	**6**	--	--	--
	Lines of code:	**51**	**8.50 ± 11.01**	**33**	`main`
	Cyclomatic complexity:	**15**	**2.50 ± 3.35**	**10**	`main`

3	**2023-10-14 09:50:44**	**Download**
Submission status:	Evaluated	
Evaluation:	0.0000	

- **Evaluator: computer**
  - Program compiled
  - Test 'Basic test with example input data': failed
    - result: 88.89 %, required: 100.00 %
    - Max. run time: 0.007 s (limit: 1.000 s)
    - Total run time: 0.057 s
    - Mandatory test failed, evaluation: 0.00 %
    - ☑ Failed (invalid output)
      - ☑ Input data **[63 B / 63 B]**

```
( -10.5 , 15.8 )
(178.23,15.8)
( 178.23, -67.2)
(-10.5, -67.2)
```

      - ☑ Output data **[25 B / 25 B]**

```
Point #1:
Invalid input.
```

      - ☑ Reference **[69 B / 69 B]**

```
Point #1:
Point #2:
Point #3:
Point #4:
The points form a rectangle.
```

  - Overall ratio: 0.00 %
- Total percent: 0.00 %
- Early submission bonus: 0.50
- Total points: 0.00 * (5.00 + 0.50) = 0.00

		Total	Average	Maximum	Function name

SW metrics:		Total	Average	Maximum	Function name
	Functions:	**6**	--	--	--
	Lines of code:	**51**	**8.50 ± 11.01**	**33**	`main`
	Cyclomatic complexity:	**15**	**2.50 ± 3.35**	**10**	`main`

2 **2023-10-14 09:50:01** **Download**

Submission status: Evaluated
Evaluation: 0.0000

- **Evaluator: computer**
  - Program compiled
  - Test 'Basic test with example input data': failed
    - result: 88.89 %, required: 100.00 %
    - Max. run time: 0.006 s (limit: 1.000 s)
    - Total run time: 0.056 s
    - Mandatory test failed, evaluation: 0.00 %
    - Failed (invalid output)
  - Overall ratio: 0.00 %
- Total percent: 0.00 %
- Early submission bonus: 0.50
- Total points: 0.00 * (5.00 + 0.50) = 0.00

SW metrics:		Total	Average	Maximum	Function name
	Functions:	**6**	--	--	--
	Lines of code:	**51**	**8.50 ± 11.01**	**33**	`main`
	Cyclomatic complexity:	**15**	**2.50 ± 3.35**	**10**	`main`

1 **2023-10-14 00:34:32** **Download**

Submission status: Evaluated
Evaluation: 0.0000

- **Evaluator: computer**
  - Program compiled
  - Test 'Basic test with example input data': failed
    - result: 66.67 %, required: 100.00 %
    - Max. run time: 0.006 s (limit: 1.000 s)
    - Total run time: 0.054 s
    - Mandatory test failed, evaluation: 0.00 %
    - ☑ Failed (invalid output)

☑ Input data **[28 B / 28 B]**

```
(0,0)
(20,0)
(20,50)
(0,50)
```

☑ Output data **[76 B / 76 B]**

```
Point #1:
Point #2:
Point #3:
Point #4:
The points do not form a rectangle.
```

☑ Reference **[69 B / 69 B]**

```
Point #1:
Point #2:
Point #3:
```

```
Point #4:
The points form a rectangle.
```

        - Failed (invalid output)
        - Failed (invalid output)
    - Overall ratio: 0.00 %
- Total percent: 0.00 %
- Early submission bonus: 0.50
- Total points: 0.00 * (5.00 + 0.50) = 0.00

SW metrics:

	Total	Average	Maximum	Function name
Functions:	**1**	--	--	--
Lines of code:	**22**	**22.00 ± 0.00**	**22**	`main`
Cyclomatic complexity:	**10**	**10.00 ± 0.00**	**10**	`main`