COMP9021 Principles of Programming
Term 1, 2024

Coding Quiz 5

Worth 4 marks and due Week 8 Thursday @ 9pm

Description

You are provided with a **stub** in which you need to **insert your code where indicated without doing any changes to the existing code** to complete the task.

Given the value of **seed** and **density**, the provided code randomly fills an array (or grid) of size **10 x 10** with **0s** and **1s**. Your task is to determine and output the **size** of the **largest parallelogram with horizontal sides**. A parallelogram consists of a **line** with **at least 2 consecutive 1s**, with **below at least one line** with the **same number of consecutive 1s**, all those lines being **aligned vertically** in which case the parallelogram is actually a **rectangle**, for instance:

```
1 1 1
1 1 1
1 1 1
1 1 1
```

or consecutive lines **move to the left by one position**, for instance:

```
    1 1 1
  1 1 1
1 1 1
```

or consecutive lines **move to the right by one position**, e.g.

```
1 1 1
  1 1 1
    1 1 1
      1 1 1
```

The **size** is the **number of 1s** in the **parallelogram**. In the above examples, the size is **12**.

See test cases below for more examples.

Due Date and Submission

Quiz 5 is due **Week 8 Thursday 4 April 2024 @ 9.00pm** (Sydney time).

Note that **late** submission with **5% penalty per day** is allowed **up to 3 days** from the due date, that is, any late submission after **Week 7 Sunday 7 April 2024 @ 9pm** will be discarded.

Make sure not to change the filename **`quiz_5.py`** while submitting by clicking on **[Mark]** button in **Ed**. It is your responsibility to check that your submission did go through properly using **Submissions** link in Ed otherwise your mark will be **zero** for Quiz 5.

Test Cases

```
$ python3 quiz_5.py
Enter two integers, the second one being strictly positive: 0 1
Here is the grid that has been generated:
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
There is no parallelogram with horizontal sides.
```

```
$ python3 quiz_5.py
Enter two integers, the second one being strictly positive: 0 2
Here is the grid that has been generated:
1 1 0 1 1 1 1 1 1 0
0 1 0 0 1 0 1 0 0 1
1 0 1 1 1 0 1 1 1 0
0 0 1 0 1 1 0 1 0 0
0 0 0 1 0 0 1 1 0 1
1 0 1 0 1 1 0 1 1 0
1 0 0 0 0 1 1 0 0 0
0 0 0 1 1 0 0 1 1 1
1 1 0 1 0 1 1 0 0 0
1 0 0 1 0 1 1 0 0 0
The largest parallelogram with horizontal sides has a size of 4.
```

```
$ python3 quiz_5.py
Enter two integers, the second one being strictly positive: 0 3
Here is the grid that has been generated:
1 1 0 1 1 1 1 1 1 1
1 0 1 0 1 0 0 1 1 1
1 1 0 1 0 1 0 1 1 1
1 0 1 1 1 1 1 0 1 1
1 1 1 0 1 0 0 1 1 1
1 1 0 1 1 1 0 1 1 1
0 0 1 0 0 0 1 1 0 0
1 1 1 0 1 1 1 1 0 1
1 1 0 1 1 1 1 1 0 1
1 1 1 0 1 0 0 0 0 1
The largest parallelogram with horizontal sides has a size of 12.
```

```
$ python3 quiz_5.py
Enter two integers, the second one being strictly positive: 0 4
Here is the grid that has been generated:
1 1 0 1 1 1 1 1 1 1
1 1 1 0 1 1 1 0 0 1
1 0 1 1 1 1 1 1 1 0
0 0 1 0 1 1 1 1 0 1
1 1 1 1 0 0 1 1 0 1
1 0 1 1 1 1 0 1 1 1
1 1 1 1 0 1 1 0 0 1
1 0 0 1 1 1 1 1 1 1
1 1 0 1 0 1 1 1 1 0
1 0 1 1 1 1 1 0 0 1
The largest parallelogram with horizontal sides has a size of 12.
```

```
$ python3 quiz_5.py
Enter two integers, the second one being strictly positive: 1 4
Here is the grid that has been generated:
    1 0 1 0 1 1 1 1 1 0
    1 0 1 1 0 1 1 1 0 1
    0 0 0 0 1 1 1 0 1 1
    1 1 1 1 1 1 1 0 1 0
    1 1 0 1 1 1 1 1 1 1
    0 1 1 1 1 1 1 1 0 1
    0 1 1 1 1 0 1 0 1 1
    1 1 1 0 1 1 1 1 1 1
    1 0 1 1 1 1 0 1 1 1
    1 1 1 1 1 1 0 1 1 0 1
The largest parallelogram with horizontal sides has a size of 16.
```

```
$ python3 quiz_5.py
Enter two integers, the second one being strictly positive: 0 5
Here is the grid that has been generated:
    1 1 0 1 1 1 1 1 1 1
    1 1 1 1 1 1 1 0 1 1 1
    1 1 1 0 0 1 1 1 0 1
    1 1 1 1 1 1 1 1 1 0
    1 0 0 1 0 1 1 1 1 1
    0 1 1 1 1 1 1 1 0 0
    1 1 1 0 1 1 1 0 1 1
    1 1 1 1 1 1 1 1 0 1 1
    1 1 1 1 1 1 1 1 0 1 1
    1 0 0 1 1 1 0 0 1 1 1
The largest parallelogram with horizontal sides has a size of 15.
```

Test Cases Explained

```
$   python3  quiz_5.py
Enter two integers, the second one being strictly  positive: 0  1
Here  is  the  grid  that  has  been  generated:
    0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0
There  is  no  parallelogram  with  horizontal  sides.
```

```
$   python3  quiz_5.py
Enter two integers, the second one being strictly  positive: 0  2
Here  is  the  grid  that  has  been  generated:
    1 1 0 1 1 1 1 1 1 0
    0 1 0 0 1 0 1 0 0 1
    1 0 1 1 1 0 1 1 1 0
    0 0 1 0 1 1 0 1 0 0
    0 0 0 1 0 0 1 1 0 1
    1 0 1 0 1 1 0 1 1 0
    1 0 0 0 0 1 1 0 0 0
    0 0 0 1 1 0 0 1 1 1
    1 1 0 1 0 1 1 0 0 0
    1 0 0 1 0 1 1 0 0 0
The  largest  parallelogram  with  horizontal  sides  has  a  size  of  4.
```

```
$ python3 quiz_5.py
Enter two integers, the second one being strictly positive: 0 3
Here is the grid that has been generated:
  1 1 0 1 1 1 1 1 1 1
  1 0 1 0 1 0 0 1 1 1
  1 1 0 1 0 1 0 1 1 1
  1 0 1 1 1 1 1 0 1 1
  1 1 1 0 1 0 0 1 1 1
  1 1 0 1 1 1 0 1 1 1
  0 0 1 0 0 0 1 1 0 0
  1 1 1 0 1 1 1 1 0 1
  1 1 0 1 1 1 1 1 0 1
  1 1 1 0 1 0 0 0 0 1

The largest parallelogram with horizontal sides has a size of 12.
```

```
$ python3 quiz_5.py
Enter two integers, the second one being strictly positive: 0 4
Here is the grid that has been generated:
  1 1 0 1 1 1 1 1 1 1
  1 1 1 0 1 1 1 0 0 1
  1 0 1 1 1 1 1 1 1 0
  0 0 1 0 1 1 1 1 0 1
  1 1 1 1 0 0 1 1 0 1
  1 0 1 1 1 1 0 1 1 1
  1 1 1 1 0 1 1 0 0 1
  1 0 0 1 1 1 1 1 1 1
  1 1 0 1 0 1 1 1 1 0
  1 0 1 1 1 1 1 0 0 1

The largest parallelogram with horizontal sides has a size of 12.
```

```
$  python3 quiz_5.py
Enter two integers, the second one being strictly positive: 1 4
Here is the grid that has been generated:
    1 0 1 0 1 1 1 1 1 0
    1 0 1 1 0 1 1 1 0 1
    0 0 0 0 1 1 1 0 1 1
    1 1 1 1 1 1 1 0 1 0
    1 1 0 1 1 1 1 1 1 1
    0 1 1 1 1 1 1 1 0 1
    0 1 1 1 1 0 1 0 1 1
    1 1 1 0 1 1 1 1 1 1
    1 0 1 1 1 1 0 1 1 1
    1 1 1 1 1 0 1 1 0 1
The largest parallelogram with horizontal sides has a size of 16.
```

```
$  python3 quiz_5.py
Enter two integers, the second one being strictly positive: 0 5
Here is the grid that has been generated:
    1 1 0 1 1 1 1 1 1 1
    1 1 1 1 1 1 0 1 1 1
    1 1 1 0 0 1 1 1 0 1
    1 1 1 1 1 1 1 1 1 0
    1 0 0 1 0 1 1 1 1 1
    0 1 1 1 1 1 1 1 0 0
    1 1 1 0 1 1 1 0 1 1
    1 1 1 1 1 1 1 0 1 1
    1 1 1 1 1 1 1 0 1 1
    1 0 0 1 1 0 0 1 1 1
The largest parallelogram with horizontal sides has a size of 15.
```