

Last name	
First name	
Group	

Grade	
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**Algorithmics**  
**Undergraduate 1<sup>st</sup> year S1**  
**Final Exam #1 (P1)**  
**8 Jan. 2019 - 10 : 00**  
**Answer Sheets**

1	
2	
3	
4	
5	
6	

**Answers 1 (Binary Search: search "path" – 2 points)**

*Valid search sequences?*

- 50 - 15 - 48 - 22 - 46 - 42            YES – NO
- 48 - 15 - 45 - 22 - 47 - 42            YES – NO
- 15 - 22 - 45 - 43 - 35 - 42            YES – NO
- 22 - 45 - 43 - 15 - 35 - 42            YES – NO

**Answers 2 (Searching algorithms – 3 points)**

1. Linear search regardless of element order:

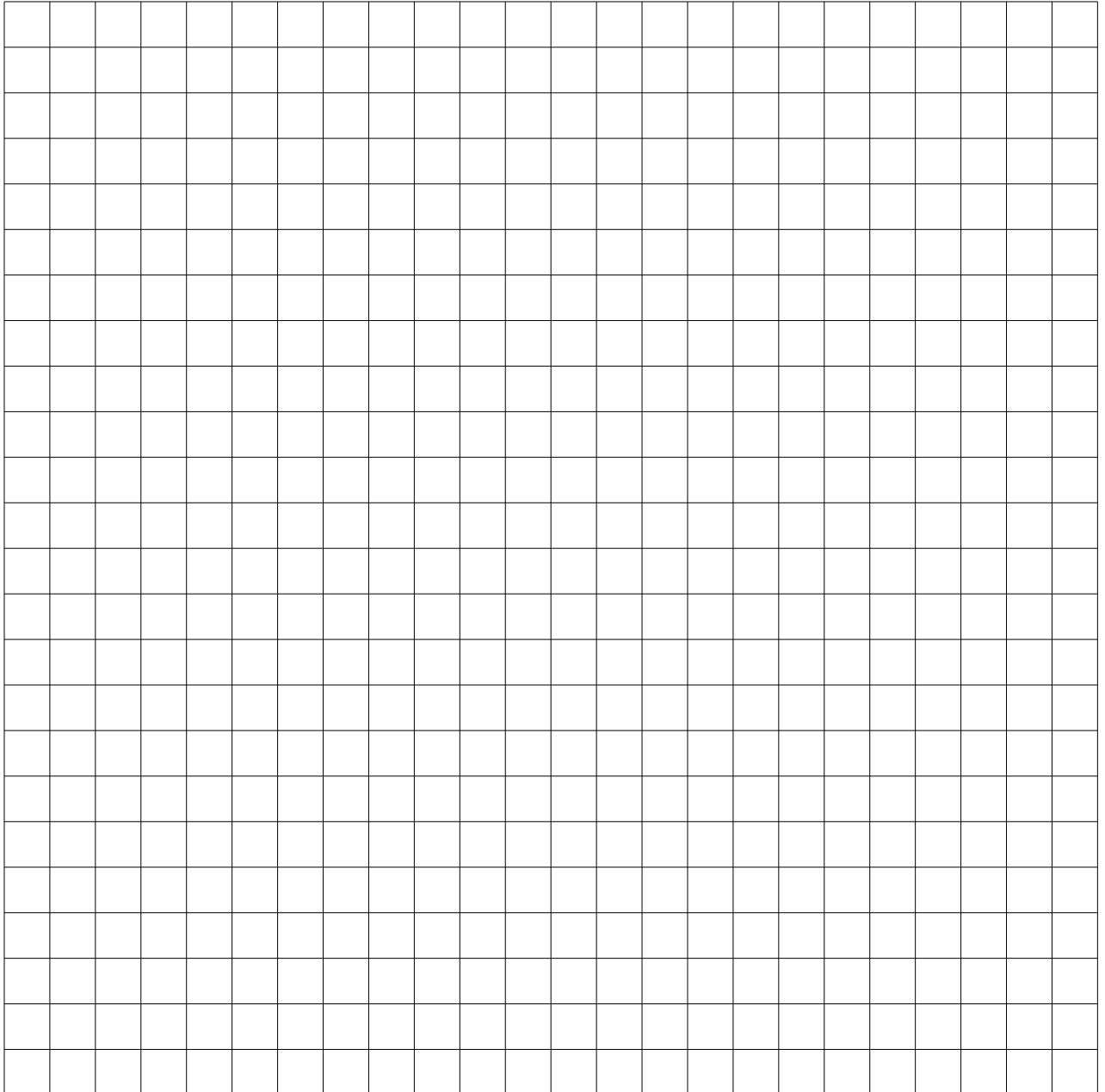
2. Linear search taking into account the element order:

3. Binary search:

*Answers 3 (See Syracuse – 3 points)*

**Specifications:**

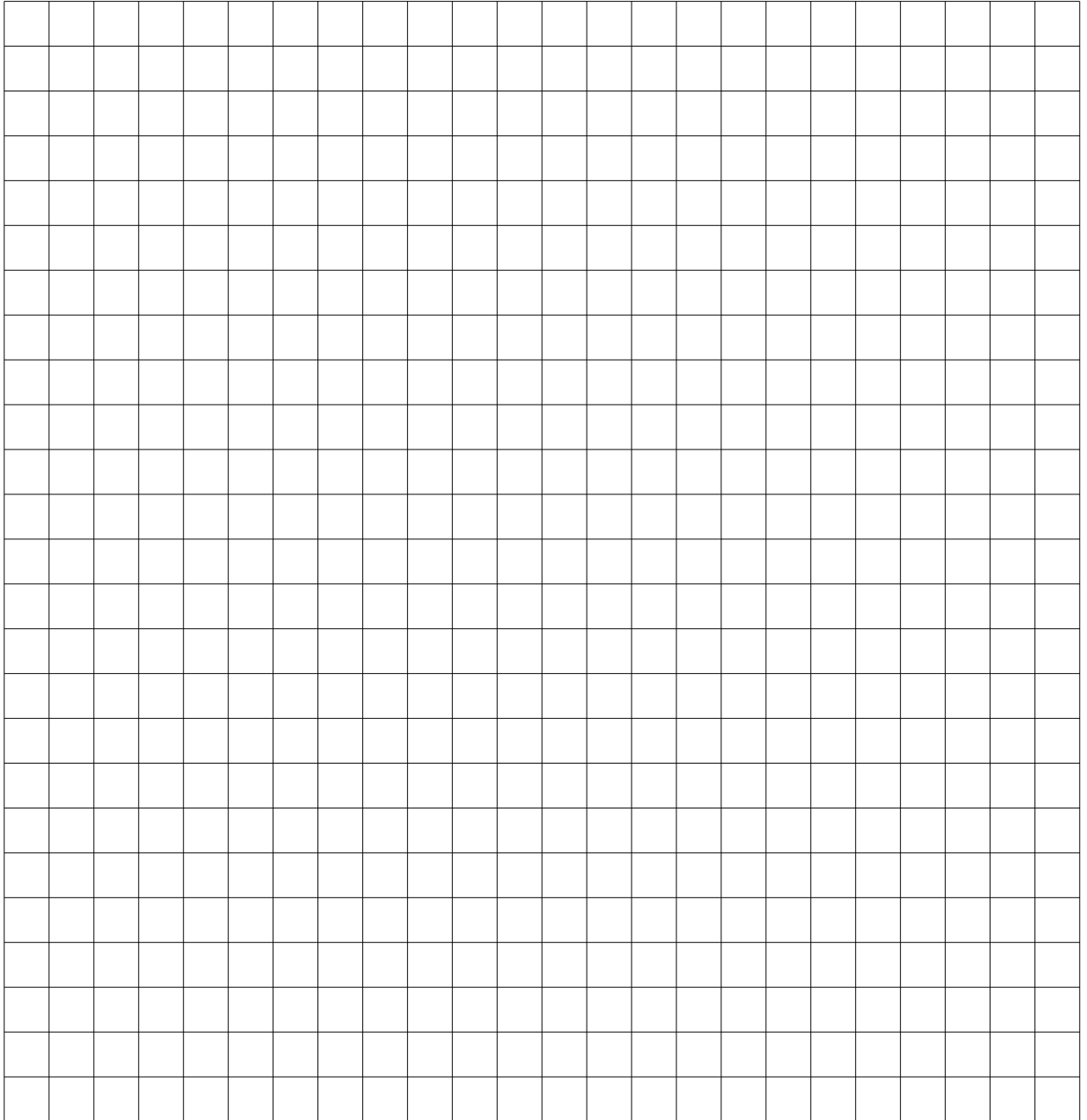
The function `syracuse(n)` builds the list  $L$  of all the Syracuse sequence numbers from  $n$  if  $n \geq 1$ . Otherwise, it returns an empty list.



*Answers 4 (Arithmetic progression – 4 points)*

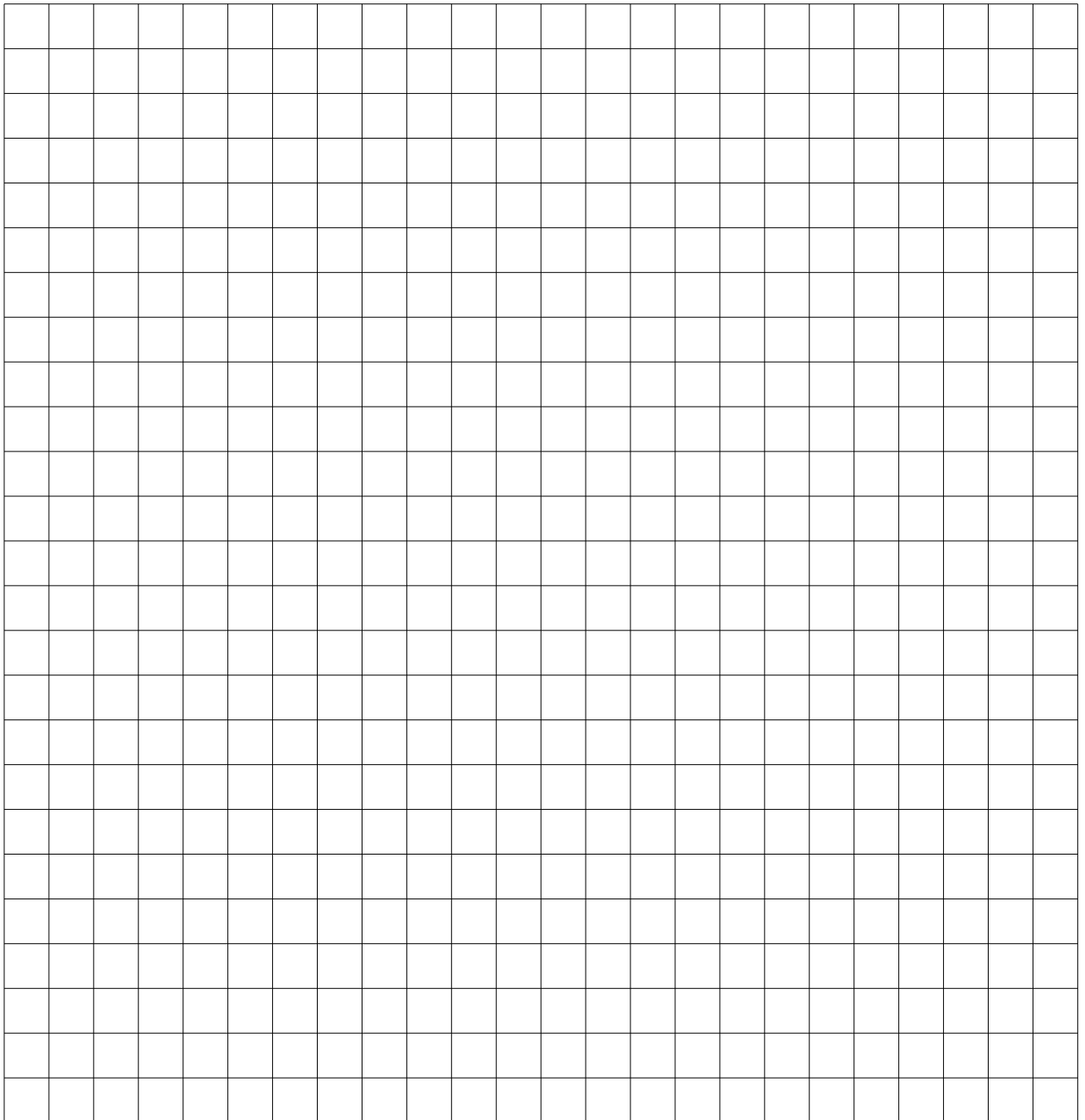
**Specifications:**

The function `arithmetic(L)` tests whether the list  $L$  has at least two elements and follows an arithmetic progression. In this case, it returns the common difference, otherwise it returns 0.



**Answers 5 (Deletion in sorted list – 5 points)****Specifications:**

The function `delete( $L, x$ )` removes the value  $x$ , if it exists, from the list  $L$  sorted in strictly increasing order and returns a boolean that indicates whether the deletion occurred.



**Answers 6 (What is it? – 3 points)**

1. Result of the following application of *what*:

```

1  >>> what([1,3,2,8,7,2,5,4,0,6,2,15])
2  .
3  .
    
```

2. We call `what(L)` with  $L$  a list of natural numbers.

(a) At the end of the first loop, what does `me` represent?

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(b) At the end of the third loop, what does `X` represent?

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(c) What does this function returns?

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3. **Bonus:** What is the complexity of this function?

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