

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**

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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.

A full-page sheet of white graph paper with a light gray border. The page contains a uniform grid of small squares, suitable for drawing or writing. The grid consists of 20 columns and 20 rows of squares, totaling 400 squares. The lines are thin and gray, creating a clean, professional appearance.

**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.

This image shows a full page of blank graph paper. The background is a very light gray, and it is covered by a precise grid of thin, dark gray horizontal and vertical lines. These lines intersect to form a series of small, identical squares across the entire surface of the page. There are no margins, text, or other markings present.

*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.

This image shows a full page of blank graph paper. The background is a very light gray, and it is covered by a precise grid of thin, dark gray horizontal and vertical lines. These lines intersect to form a series of small, identical squares across the entire area of the page. There are no margins, text, or other markings present.

**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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