# MATHEMATICS I-Part A

## October, 2, 2019



## Classwork #2

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1) *(1 point)* Complete the table indicating, for each set, max/min points (if they exist) and sup/inf.

| Set | Max | Min | Sup | Inf |
|---|---|---|---|---|
| $(0,1) \cup \left\{\frac{3}{2}\right\}$ | $\frac{3}{2}$ | $\nexists$ | $\frac{3}{2}$ | $0$ |
| $[0,1] \cup \left\{-\frac{3}{2}\right\}$ | $1$ | $-\frac{3}{2}$ | $1$ | $-\frac{3}{2}$ |

2) *(1 point)* Compute limit, isolated, interior, exterior and boundary points of the set

$$E = \left\{ \frac{2}{n} \,\middle|\, n \in \mathbb{N}, n > 0 \right\}.$$

Establish if the set is open/closed or neither open nor closed. **Motivate your answers**.

The set of limit point is $E' = \{0\}$, any other $x \neq 0$ cannot be a limit point. All point $x \in E$ are isolated points, since they are not limit points. There are no interior points, since if $p \in E$ is not possible to find a neighbourhood $N_\varepsilon(p)$ such that $N_\varepsilon(p) \subset E$. The exterior points are the points of the set $\mathbb{R} \setminus E \cup \{0\}$: we must exclude $x = 0$ since, being a limit point, it cannot be an exterior point. The set of boundary points is $E \cup \{0\}$, since all the points of $E$ as well as 0 have the property that, every neighbourhood of them has a non-empty intersection with both $E$ and $E^c$. The set does not contain all its limit points, whence is not closed. It is not true that every point of $E$ is an interior point of $E$, whence the set is not open. In conclusion: the set is neither closed nor open.

3) *(1 point)* Given the set $A = \{1,2,3\}$ and the set $B = \{0,3\}$ compute the set operations

$$A \setminus B, \quad A \cap B.$$

$$A \setminus B = \{1,2\}$$

$$A \cap B = \{3\}$$