

# MATHEMATICS - FIRST EXERCISE LESSON

Monday, September 28 2015

1) Given the set

$$A = \left\{ x = 1 - \frac{1}{n}, n \in \mathbb{N} - \{0\} \right\} \cup [1, 2)$$

find its internal points, its accumulation points, its boundary points and its isolated points.

2) Solve the following equations

$$\frac{x+1}{3} - \frac{2(x-1)}{5} + \frac{2}{3} = \frac{x-4}{5} - \frac{4}{15}x$$

$$x^2 - 5x + 6 = 0$$

$$x - (2x - 1)^2 + \frac{1}{2} = \frac{3-x}{2} - (3x - 1)(x - 2)$$

$$2x^4 - 162 = 0$$

$$2x^3 - 4x^2 = 16x$$

$$(2x - 1)(2x^3 - 50x) = 0$$

$$x^3 + 3x^2 - x - 3 = 0$$

$$x(4x - 1) = 2x(4x - 1)^2$$

$$x^4 - 53x^2 + 196 = 0$$

$$\frac{2}{x^2-x} - \frac{4}{x^2-1} = \frac{1}{x^2+x}$$

$$\frac{x+3}{x^2-2x+1} = \frac{x-2}{x-1} + \frac{4}{(x-1)^2}$$

$$\frac{7x-10}{x^2-6x+8} - \frac{5}{2-x} = \frac{x+5}{x-4}$$

3) Solve the following inequalities writing the solution in interval form

$$(3x - 1)(4x + 5)(1 - x) > 0$$

$$9x^2 < 25$$

$$\frac{1}{2}(x - 1) \leq x^2 - x$$

$$(x^3 - 4x)(2x^2 + 1) \geq 0$$

$$x^4 - 1 > 0$$

$$\frac{3x-1}{x+2} < 0$$

$$\frac{25-x^2}{5x+x^2} \leq 0$$

$$\frac{2x}{x^2-9} > \frac{1}{x-3} - \frac{x-2}{x^2+6x+9}$$

4) Given the following sets

$$A = \left\{ x \in \mathbb{R} : \frac{x-1}{x+2} \geq 0 \right\}$$

$$B = \{x \in \mathbb{R} : x^2 - 4x + 5 \geq 0\}$$

$$C = \{5, 7\}$$

find accumulation points, interior and exterior points, isolated points.  
Moreover determine  $A^c$ ,  $A^c$ ,  $A \cup B$ ,  $A \cap B$ ,  $A^c \cap C$ .