MATHEMATICS - FIRST EXERCISE LESSON

MONDAY, SEPTEMBER 26 2016

1. Given the following sets

$$A = (-\infty, -3)$$

$$B = (-\sqrt{7}, 2\sqrt{2})$$

$$C = (-2, +\infty)$$

Determine $A \cup B \cup C$, $A \cap B \cap C$, $A \cup B$, $A^c \cap B^c \cap C^c$ and for each set determined find accumulation points, boundary points, interior and exterior points, isolated points, infimum, supremum, max and min.

2. Given the set

$$A = \left\{ x = \frac{n}{n+1}, n \in \mathbb{N} \right\}$$

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

3. Solve the following equations:

- $\frac{2x-1}{3} - \frac{x-5}{6} = \frac{x-3}{4}$
- $2(3x+1) + x - 3(2x+1) = x + 4(x-1) - (4x+3)$
- $2\left(x + \frac{1}{2}\right) = 5x + 1 - 3x$
- $(1-x)^3 - (x-2)^2 = 3 - x^3$
- $2x^2 - 5x + 3 = 0$
- $\frac{(2x-3)^2}{4} - \frac{3}{2} + \frac{x}{2} = x(1-x)$
- $2(3-2x)^3 = 8x - 16x^3 + 10$
- $\frac{x}{4} - \frac{1}{2}\left(\frac{1}{2}x + \frac{x-3}{2} - \frac{x+2}{3} - \frac{x}{4}\right) = \frac{1}{12}(1-3x) - \frac{11}{24}$
- $\left(2x - \frac{1}{3}\right)\left(2x + \frac{1}{3}\right) - \left(2x + \frac{1}{3}\right)^2 + 4x\left(x + \frac{1}{3}\right) = 0$
- $x^5 - 2x^4 = x^3 - 2x^2$
- $3x^2 - \frac{1}{27}x^6 = 0$
- $x^4 + 9x^2 = 6x^2$

- $x^6 = 7x^3 + 8$
- $\left\{\frac{1}{x+2} - \frac{1}{(x+2)^2}\left[x - \frac{12-2x(x+1)}{x-2}\right]\right\} \div \left(\frac{1}{2-x} + \frac{6-x}{x^2-4}\right) = 2x$
- $\frac{2x}{x-1} - \frac{1-x}{x} - \frac{1}{x-x^2} = \frac{2-2x-3x^2}{x^2-x}$

4. Solve the following inequalities writing the solution in interval form:

- $3x + \frac{2}{3} > x + 8 - 11x$
- $\frac{3x-12}{x^2-9} > 0$
- $x^2 + 2x - 3 < 0$
- $\frac{3x^2+2x-8}{6x^2+19x+15} \leq 0$
- $x^4 - 2x^2 \geq 0$
- $2x^3 - x^2 - 2x + 1 > 0$
- $(x^2+4)(x-2)^2(x^3-1) \leq 1$
- $\frac{3x-1}{x+2} < 0$
- $\frac{(-x^2+3x)(x^2-4)}{x^2+4} \leq 0$
- $\frac{x^2+4x}{4x^2-1} + 1 > \frac{2}{2x+1} - \frac{2x}{1-2x}$