IGEE-UMBB

EE 174 : Recitations set 1

1. Given the sets A, B show that $\overline{A \cup B} = \overline{A} \cap \overline{B}$

2. Consider the set $S = \{x / ax^2 + bx + c = 0\}$ where x is a real variable and a, b, c are real constants; What is the cardinality of S ?

3. Consider the set $\mathcal{R}$ of real numbers
   (a) Is $\{\mathcal{R}, +\}$ a group where $(+)$ is the usual addition ?
   b) Repeat for $\{\mathcal{R}, \times\}$ where $(\times)$ is the usual multiplication ?

4. Let $\{G, *\}$ be an Abelian group, show that for all $a, b, x \in G$ we have
   a) $a * x = b * x \Rightarrow a = b$
   b) $a * x = b \Rightarrow x = a^{-1} * b$
   c) $(a * b)^{-1} = b^{-1} * a^{-1} = a^{-1} * b^{-1}$

5. Consider $\{\mathcal{R}^2, +, \circ\}$ where the binary operations $(+)$ and $(\circ)$ are defined as follows:
   $(x_1, y_1) + (x_2, y_2) = (x_1 + x_2, y_1 + y_2)$ and $(x_1, y_1) \circ (x_2, y_2) = (x_1 x_2, y_1 y_2)$.
   Is $\{\mathcal{R}^2, +, \circ\}$ a ring? Is it commutative? Does it have a unit element?

6. Consider $\{\mathcal{R}^2, +, \circ\}$ where the binary operations $(+)$ and $(\circ)$ are defined as follows:
   $(x_1, y_1) + (x_2, y_2) = (x_1 + x_2, y_1 + y_2)$ and $(x_1, y_1) \circ (x_2, y_2) = (x_1 x_2 - y_1 y_2, x_1 y_2 + y_1 x_2)$.
   Is $\{\mathcal{R}^2, +, \circ\}$ a field ?