I. Do what is asked.

1. Give a **negative integer** whose multiplicative inverse is itself.
2. Give an **integer** whose additive inverse is non-negative.
3. Given $U = \{a, b, c, d, e\}$. Give an example of **two subsets A and B** of $U$ such that $A \cup B = \{a, b, c\}$ and $A \cap B = \{b\}$.

II. Let

$$U = \left\{-3, -\frac{3}{2}, -1, 0, \frac{1}{2}, \sqrt{3}, 2, \pi\right\}$$
$$A = \{x | x \text{ is a rational number}\}$$
$$B = \{y | y \text{ is the additive inverse of a positive integer}\}$$

1. Write $A$ in roster form.
2. Write $B$ in roster form.
3. Write $A \cap B$ in roster form.
4. Write $A \setminus \left\{\frac{1}{2}, -\frac{3}{2}, 0, \sqrt{3}\right\}^C$ in roster form.
5. Find the set $C$, a subset of $U$ such that
   $C$ has exactly one element and is closed under addition.

III. **Simplify** the following.

1. $2 - 4(2x + 3)^2 + (3 - x)(3 + x)$
2. $\left(\dfrac{(-5)^4(2+3)^5x^7y}{(-25)^3\left(\frac{x}{y}\right)^{-2}}\right)^{-2}$
3. $\dfrac{3}{y+3} + \dfrac{2}{y-3} - \dfrac{12}{y^2-9}$
4. $\dfrac{2}{1 - \dfrac{3}{4 - \dfrac{5}{x+6}}}$
5. $\dfrac{y^4 - 125y}{2y^2 + y - 6} \div \dfrac{5y^2 + 25y + 125}{4y^2 - 12y + 9}$

IV. Use long division to divide $3y^4 - 4y^3 - 1$ by $y^2 - y - 1$.
**Encircle** the quotient and **box** the remainder.

V. **Factor** the following completely.

1. $9x^4 + 14x^2 + 25$
2. $a^2 - 4ab + 4b^2 - a + 2b - 20$

**END**