Mini-Lecture 1.4

Linear Inequalities

Learning Objectives:

- 1. Represent inequalities using the real number line and interval notation.
- 2. Understand the properties of inequalities.
- 3. Solve linear inequalities.
- 4. Solve problems involving linear inequalities.

Preparing for Linear Inequalities:

- *i*) Replace the question mark by \langle , \rangle , or = to make the statement true:
 - $-\frac{5}{9}?-\frac{8}{13}.$

ii) Determine if the following is *True* or *False*: $\frac{0}{-5} \le 0$.

DEFINITION: INTERVAL NOTATION

Let *a* and *b* represent two real numbers with a < b.

A closed interval, denoted by [a, b], consists of all real numbers x for which $a \le x \le b$.

An **open interval**, denoted by (a, b), consists of all real numbers x for which a < x < b.

The **half-open**, or **half-closed**, **intervals** are (a, b], consisting of all real numbers *x* for which $a < x \le b$ and [a, b], consisting of all real numbers *x* for which $a \le x < b$.



Examples:

1. Write in interval notation and graph the inequality. a) x < 5 b) $-2 \le x < 3$

c) $x \ge -1$

- 2. Solve each linear inequality. Express your answer in set-builder notation.
 - a) 5x + 6 > -19 b) $-\frac{2}{3}x \ge 4$

3. Solve each linear inequality. Express your answer in interval notation. a) $-2x - 5 \le 7x - 23$ b) 3(3x + 4) < -3(x - 6)

4. Solve the linear inequality and graph the solution set: $\frac{x}{3} > \frac{3}{2} - \frac{3x-1}{6}$.

5. **Commissions** Nghiep sells digital cameras. His annual salary is \$25,000 plus a commission of 5% on all of his sales. What is the value of the digital cameras Nghiep needs to sell so that his annual salary will be at least \$36,000?