6.1 Graphing Linear Inequalities In Two Variables

Cody, Riley and Antosh are in the nut business. They are making mixtures of nuts and raisins to sell in bulk. The supplier charges $25/kg for nuts and $8/kg for raisins.

A. What are some possible combinations of nuts and raisins that would total $200 for the mixture?

B. Can you represent this with an equation?

C. What is the domain (nuts) and range (raisins) for each?

D. Use the information in C to help you graph the relationship.

E. What REGION of the graph represents different possibilities, especially if they spend less than $200?

F. Is the SOLUTION SET represented by the region above the line, below the line or the line itself?

G. Do you think the line should be solid or dashed?
Look at the graph of \( y = x \).

The line divides the plane into two half-planes:

- \( y < x \) is the region below the line.
- \( y > x \) is the region above the line.
- \( y = x \) is the boundary line.

**A solid boundary line is used to represent \( \leq \) or \( \geq \).**

**A dotted boundary line is used to represent < or >.**

### To graph an inequality:

1. Graph the boundary line.
2. Pick a point not on the line and substitute it into the inequality.
3. If the inequality is satisfied, shade the region containing the point. If not, shade the other region.

### Example 1:

Graph \( 4x - 5y < 20 \).
Example 2:  Graph $2x - 5y \geq 10$.

Example 3:  Graph the solution set for each linear inequality on a Cartesian plane:

a.  $\{(x, y) \mid 3 - y > 0, x \in R, y \in R\}$

Continuous Data:

b.  $\{(x, y) \mid -3y + 9 \geq -3 + y, x \in I, y \in I\}$

Discrete Data:
Example 4:  Write an inequality to represent each graph:

a.  

b.  

c.  

Example 5:  Ben is buying snacks for his friends. He has $10.00. The choices are apples for $0.80 and muffins for $1.25.

a) Write an inequality in two variables to model this situation. Define your variables.

b) State the restrictions on the variables.

c) Graph the inequality.

d) Why is (5, 4.8) not a solution?