7.1 Linear Inequalities in Two Variables

A linear inequality in two variables may be in one of the following forms:

Where A, B, and C are _____.

An inequality in two variables describes _____ in the Cartesian plane. Any point (x , y) that _____ the inequality is a solution to the inequality. The set of all points that satisfy the inequality is called the _____ or _____.

Example 1: Which points are solutions to the given inequality?

$3x - 2y \geq -16$ $\{(-3,\ 4)\ ,\ (0,\ 2)\ ,\ (-5,\ 3)\}$

The line related to the linear equality $Ax + By = C$ is the _____ that divides the Cartesian plane into two possible regions.

- When the inequality sign is $\geq$ or $\leq$, the points on the boundary are _____ and the graph is a _____.

- When the inequality sign is $>$ or $<$, the points on the boundary are _____ and the graph is a _____.

Steps to graphing a linear inequality in two variables:

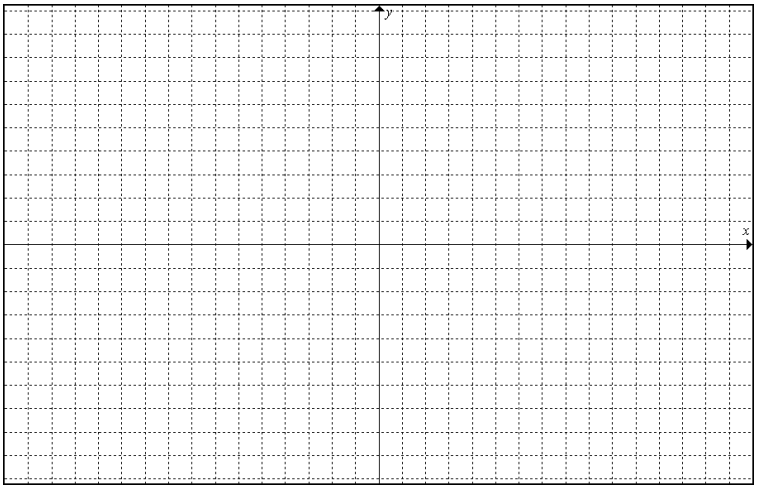
1) _____

2) _____

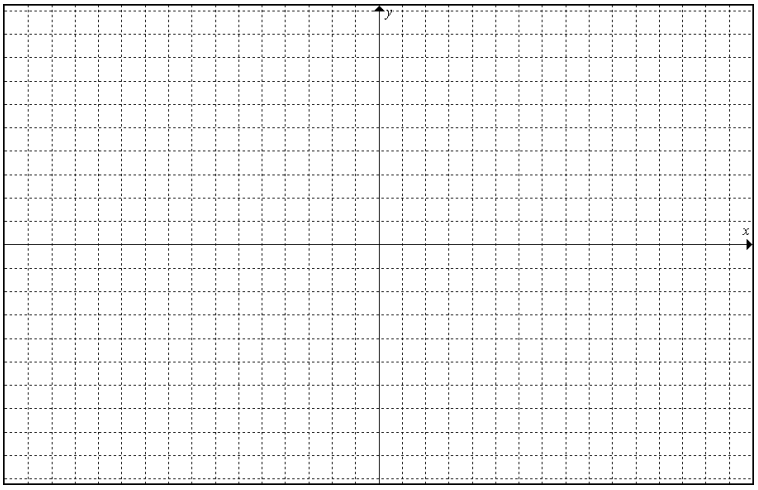
3) _____

4) _____

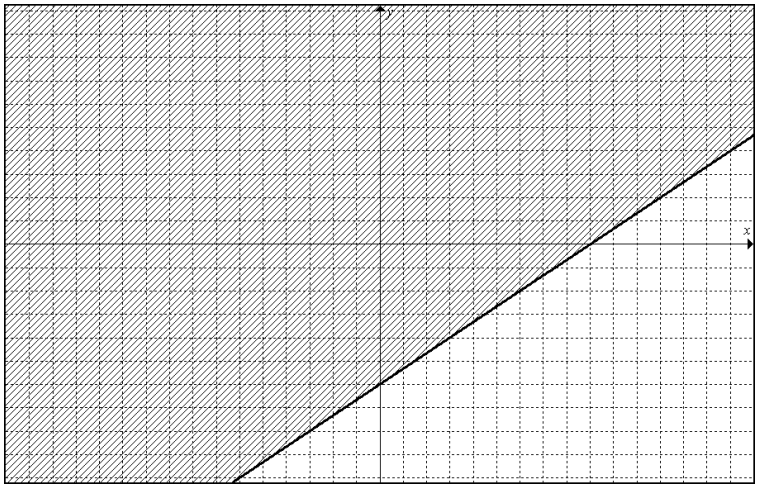
Example 2: Graph $2x + 3y \leq 6$



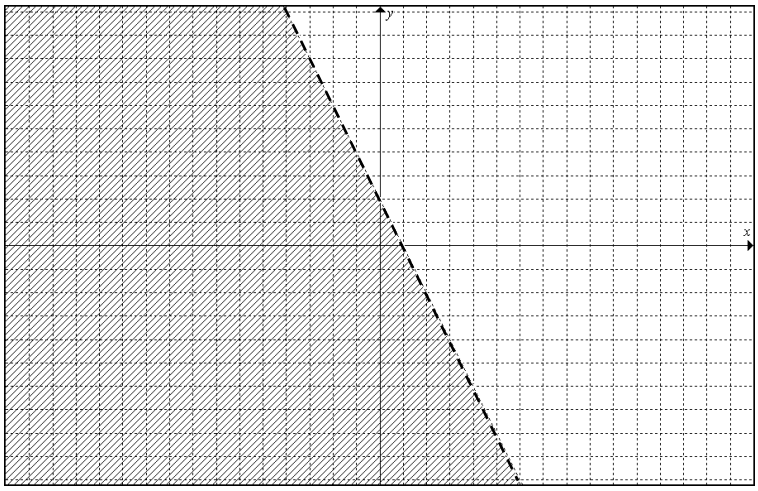
Example 3: Graph $5x - 20y < 0$



Example 4: Write an inequality to represent the following graph.



Example 5: Write an inequality to represent the following graph.



Practice: p. 472 # 1a, 2a, 3de, 9 (use graph paper)

7.2 Quadratic Inequalities in Two Variables

A quadratic inequality in two variables may be in one of the following forms:

An inequality in two variables describes _____ in the Cartesian plane. Any point (x , y) that _____ the inequality is a solution to the inequality. The set of all points that satisfy the inequality is called the _____ or _____.

The parabola related to the quadratic equality $y = ax^2 + bx + c$ is the _____ that divides the Cartesean plane into two possible solution regions.

- When the inequality sign is ≤ or ≥, the points on the boundary are _____ and the graph is a _____.

- When the inequality sign is < or >, the points on the boundary are _____ and the graph is a _____.

Steps to graphing a quadratic inequality in two variables:

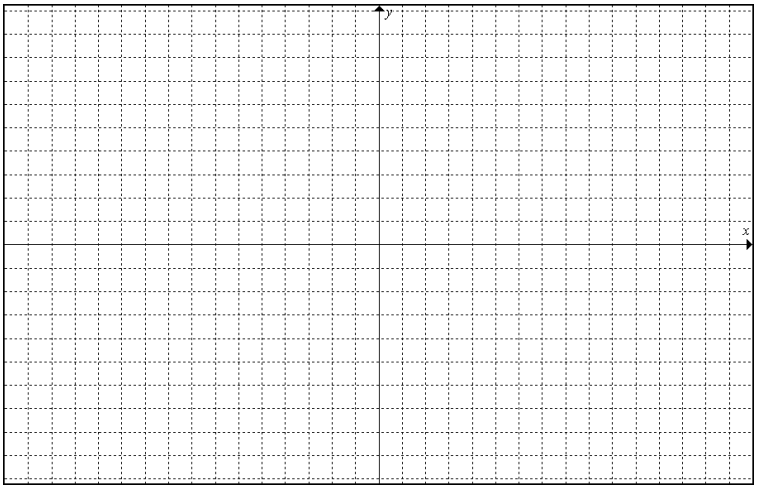
1) _____

2) _____

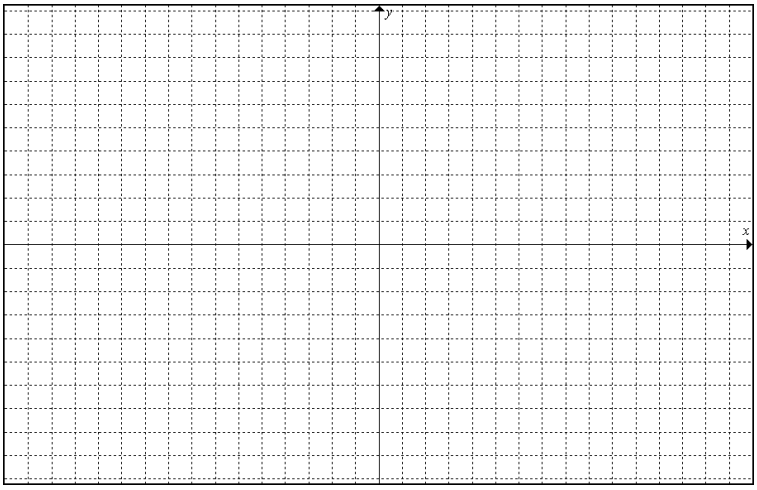
3) _____

4) _____

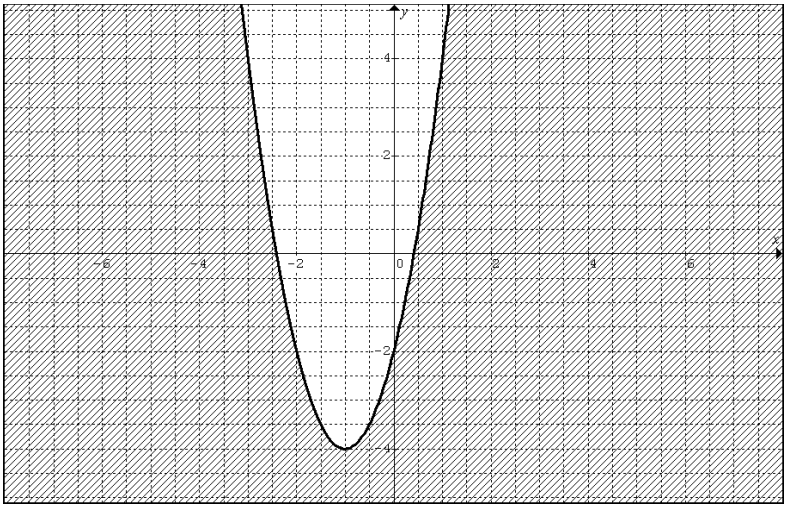
Example 1: Graph $y < -2(x-3)^2 + 1$



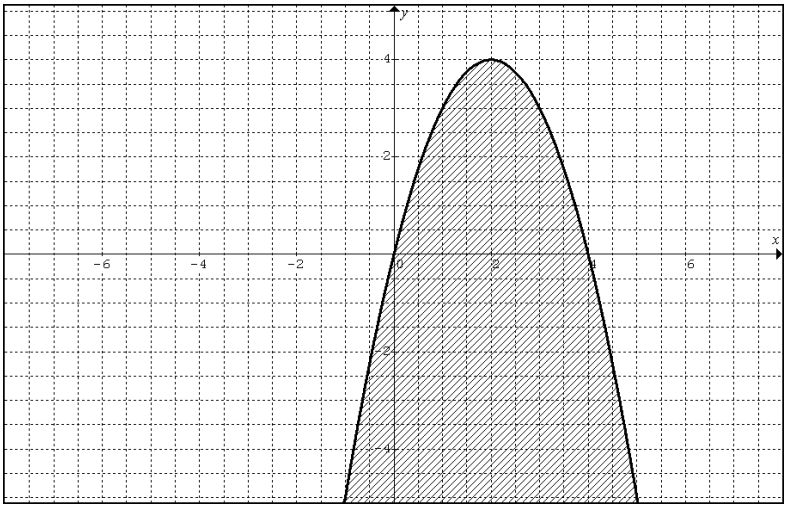
Example 2: Graph $y \geq x^2 - 4x - 5$



Example 3: Write an inequality to represent the graph.



Example 4: Write an inequality to represent the graph.



Practice: p. 496 # 3ab, 4ab, 6ab, 7ab

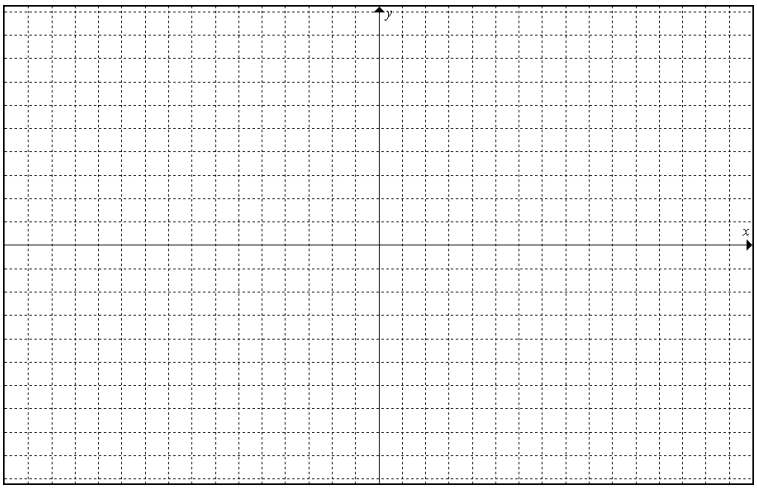
7.3 Quadratic Inequalities in One Variable

$ax^2 + bx + c < 0$ $ax^2 + bx + c \leq 0$ $ax^2 + bx + c > 0$ $ax^2 + bx + c \geq 0$

Where a, b, and c are real numbers and $a \neq 0$

Example 1: Solve $x^2 - 2x - 3 \leq 0$

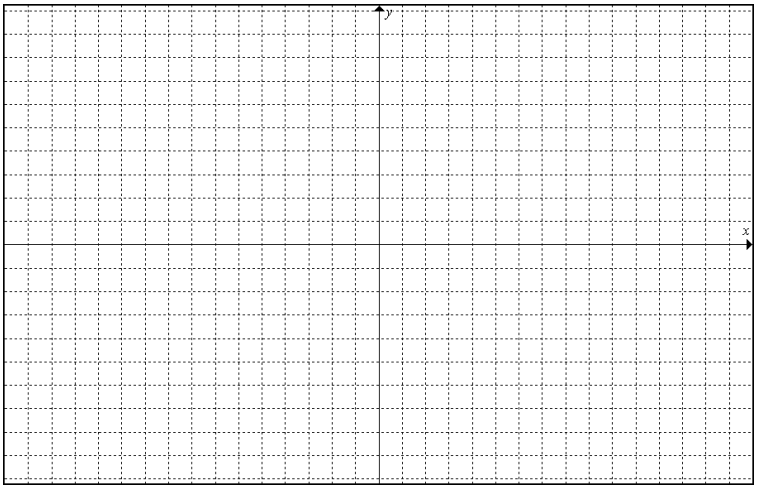
a) **Graphically**



b) **Algebraically** (Roots and Test Points)

Example 2: Solve $2x^2 - 12x > -10$

a) **Graphically**



b) **Algebraically** (Roots and Test Points)

Practice: p. 484 # 3a, 4a, 6abc, 7ab (Need graph paper)

Unit 7 WORD PROBLEMS

Linear and Quadratic Inequalities

Read the question a few times. Draw a sketch/graph. Solve. Write a conclusion.

1. Speed skaters spend many hours training on and off the ice to improve their strength and conditioning. Suppose a team has a monthly training budget of $7000. Ice rental is $125/h and gym rental is $55.h. Determine the solution region that the team can afford. Sketch and write a conclusion.

2. Cousin Maria has purchased a new smart phone and is trying to decide on a service plan.
   Plan A: each minute of use costs $0.30 and each megabyte of data costs $0.05.
   Plan B: allows unlimited talk and data but costs $100/month.
   Under which circumstances is Plan A a better choice than Plan B for Cousin Maria? Write an inequality and sketch it.

3. Suppose that you are constructing a tabletop using aluminum and glass. The most that you can spend on materials is $50. Laminated safety glass costs $60/m^2, and aluminum costs $1.75/ft. You can choose the dimensions of the table and the amount of each material used. Find all possible combinations of materials sufficient to make the tabletop. Write an inequality that represents the maximum amount of material that can be bought and then sketch it. What does the shaded region represent?

4. In Nunavut, Amaruq has a par-time job that pays her $12/h. She also sews baby moccasins and sells them for a profit of $12/pair. Amaruq needs to earn at least $250.week as she is saving for college.
   a) Write an inequality that represents the number of hours that Amaruq can work and the number of baby moccasins she can sell to earn at least $250.
   b) Graph the inequality. What does the shaded region represent?
   c) List at least 3 ordered pairs in the solution.

5. One leg of a right triangle is 2 cm longer than the other leg. How long should the shorter leg be to ensure that the area of the triangle is greater or equal to 4 cm^2? Show your inequality. Conclusion.

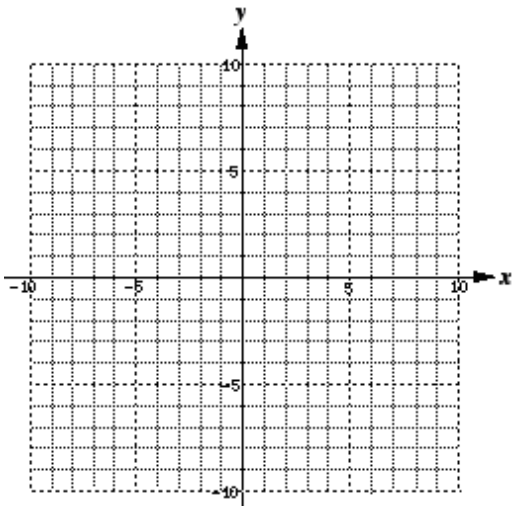
6. Farmer John wants to build a new rectangular corral (pen) for Hershey. The width of the rectangle is 8 m more than the length. What are the possible dimensions of the corral if the area is to be at least 825 m^2?

Practice: p. 503 # 14, 15, 16

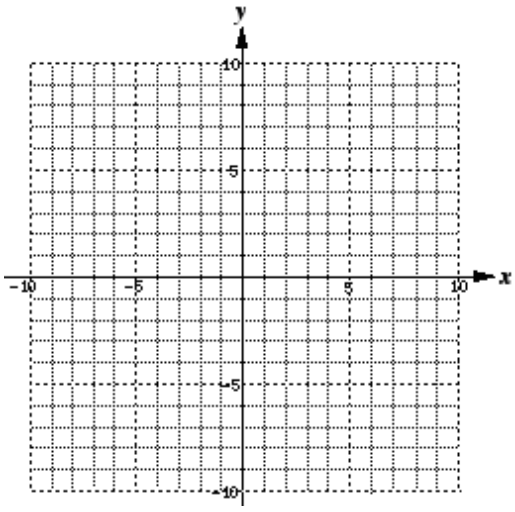
Unit 7 REVIEW

1. Graph:

a) $2x+3y>-3$

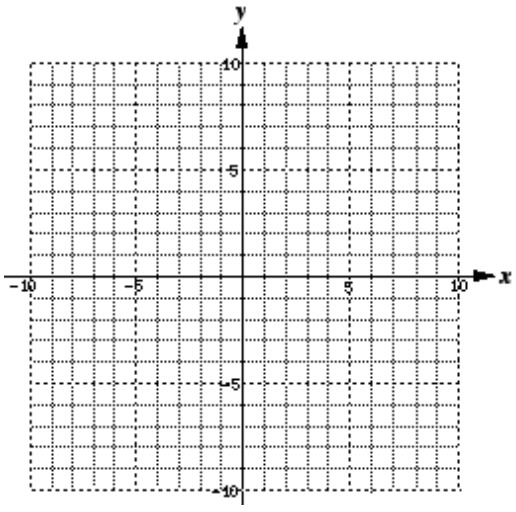


b) $-4x-2y+8\geq 0$



2. Solve $x^2-2x-3<0$:

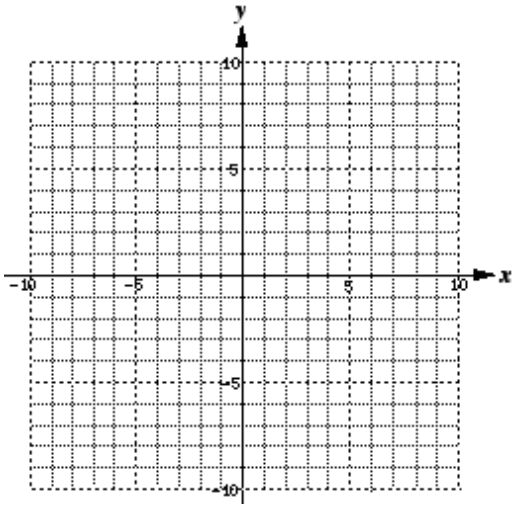
a) Graphically



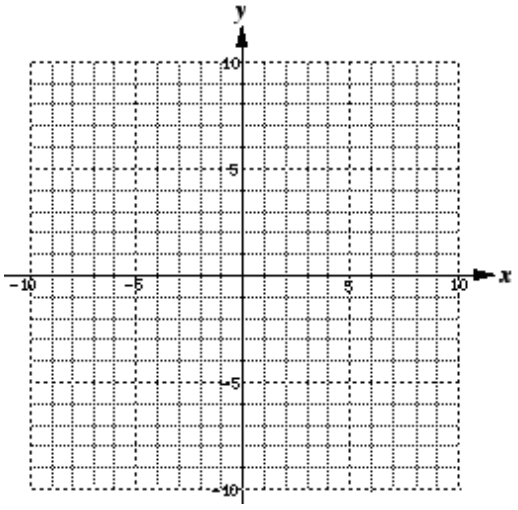
b) Algebraically

3. Graph:

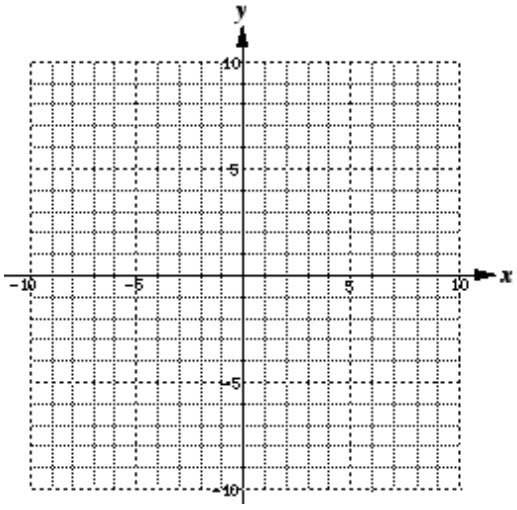
a) $y < x^2 - 2x - 3$



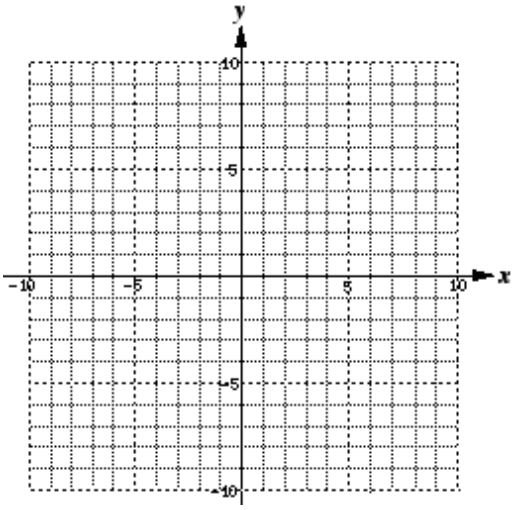
b) $y \geq -2(x-2)^2 + 3$



c) $xy > 6$



d) $y \geq |-2x + 6|$



Extra practice: p.504 # 1, 2, 3, 5, 6, 8

Unit 7 test next class