Problem Set 2

Intermediate Math Circles Winter 2018
More Fun With Inequalities

Rational Inequalities

Solve each of the following inequalities algebraically and illustrate your answer on a number line.

1. $\frac{1}{x} \leq -7$
2. $\frac{3}{x-2} \geq \frac{1}{4}$
3. $\frac{x-3}{x+1} < 2$

More Absolute Values

Solve each of the following inequalities algebraically

1. $|x| \geq 7$
2. $|x-6| < 5$
3. $|x+2| \geq 8$

Solve each of the following inequalities graphically

4. $|3x| > 6$
5. $|x+1| + |x+6| \geq 4$
6. $|x-7| + |x-1| < 8$

Use your knowledge about absolute values to prove the following properties. *Hint: cases are your friend.*

7. If a and b are any real numbers and $b \neq 0$, then $\left|\frac{a}{b}\right| = \frac{|a|}{|b|}$
8. If a is a real number and n is an integer, then $|a^n| = |a|^n$

Two Variable Linear Inequalities

Graph the following regions that satisfy the inequalities

1. $x - y < 5$
2. $x + 2y > 6 \cap 2x - y \leq 4$
3. $3x - y \leq 12 \cap x + y < 5 \cap x - 2y > 4$
4. Find a friend and try Inequality Battleship again. Except this time each of you uses a ship that only occupies a single lattice point.