Problem Set 3

Intermediate Math Circles Fall 2019
Even More Fun With Inequalities

Two Variable Linear Inequalities

Graph the following regions that satisfy the inequalities

1. $x - 2y \geq 3$
2. $x - 2y \geq 3 \ \cap \ x - 2y \leq 6$
3. $5x + 3y < 12 \ \cup \ x - 2y \leq 6$
4. $x - y < 5$
5. $x + 2y > 6 \ \cap \ 2x - y \leq 4$
6. $3x - y \leq 12 \ \cap \ x + y < 5 \ \cap \ x - 2y > 4$

More Absolute Values (Review)

Solve each of the following inequalities algebraically and graphically

1. $|x - 7| + |x - 1| < 8$

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

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

Triangle Inequality

1. A triangle can be formed having side lengths 4, 5 and 8. It is impossible however, to construct a triangle with side lengths 4, 5 and 10. Using the side lengths 2, 3, 5, 7 and 11, how many different triangles *with exactly two equal sides can be formed*?