Inequalities and Absolute Values – Problems

1. Solve the following inequalities, sketch their solution on the number line and express the answer in interval notation.
   (a) \( x^2 + 3x > 4x + 6 \)
   (b) \( 2x + 5 \leq 4x - 7 \)
   (c) \( 1 \leq 3x + 5 < 4 \)
   (d) \( 3 < |3x + 9| < 6 \)
   (e) \( x - 3 \leq \frac{10}{x} \)

2. Solve the following inequalities, and express the answer in interval notation.
   (a) \( 1 < |5 - x| < 8 \)
   (b) \( 4 \leq \frac{4}{3 - x} < 6 \)
   (c) \( 9 - x^2 < 0 \)
   (d) \( |9 - x^2| < 1 \)
   (e) \( (x - 2)(5 - x)(4x - 3) \geq 0 \)
   (f) \( \frac{5 - x}{8 - 2x} \leq 0 \)

3. Solve the following inequalities, and sketch the corresponding solutions.
   (a) \( 3x + y \leq 5 \)
   (b) \( 2x + 4y > 12 \)
   (c) \( 4x - 2y < 18 \)
   (d) \( 2y - 3x < -14 \)
   (e) \( |x - y| < 1 \)

4. Express all points \( x \) strictly within 5 units of 3, excluding 3. Sketch the set, express it in terms of intervals, and as inequalities.

5. Determine which of the points \( (1, 3), (2, 5), (10, -14) \) lie in the region corresponding to the inequality \( 3x - 2y \leq -5 \).