Solving Systems of Nonlinear Inequalities

Solve each system of nonlinear inequalities by graphing each inequality, and shading the feasible region. You may wish to consider working with multiple colors and/or patterns to more easily work through the problem. Please clearly indicate the feasible region by shading it noticeably darker than any other area. Lastly, determine if the given points are solutions to the system. For the odd questions, algebraically determine if the given point is a solution to the system.

1) \( y > |x + 5| \) Test \((0, 2)\) and \((-1, 6)\)

2) \( y > |x - 1| - 5 \) Test \((4, -2)\)

3) \( y \leq (x - 4)^2 - 5 \) Test \((8, 0)\)

4) \( y < (x + 4)^2 - 6 \) Test \((0, 11)\)
5) \( x > -1 \) \hspace{1cm} \text{Test } (0, 0) \hspace{1cm} 6) \ y < x^3 \hspace{1cm} \text{Test } (0, 0) \\
\ y \leq -x^2 + 6 \hspace{1cm} \ y \leq -x^3 \hspace{1cm} \ y > -6 \\
\ x \leq 1 \hspace{1cm} 7) \ y < (x - 3)^3 \hspace{1cm} \text{Test } (3, 0) \text{ and } (28, -3) \\
\ y \geq -\sqrt{x - 3} \hspace{1cm} \ y \geq -\sqrt{x + 3} + 2 \hspace{1cm} \text{Test } (2, 2) \\
\ y \geq -\sqrt{x - 3} \hspace{1cm} 8) \ y < \sqrt{x + 3} + 2 \\
\ y \geq (x - 1)^2 - 2
Answers to Solving Systems of Nonlinear Inequalities

1) \((0, 2)\): No, \((-1, 6)\): No

2) \((4, -2)\): No

3) \((8, 0)\): Yes

4) \((0, 11)\): No

5) \((0, 0)\): Yes

6) \((0, 0)\): No

7) \((3, 0)\): Yes, \((28, -3)\): Yes

8) \((2, 2)\): Yes