Systems and Inequalities: R6, R7, R8

- **Solve the related equation (=) to identify critical values. Use test points to determine correct intervals, or draw on a number line.**
- **When graphing, graph the related equation (=).**
  If ≤ or ≥, draw graph with a solid line or curve.
  If < or >, draw graph with a broken line or curve. Use test point (0, 0) to determine the area to shade.
- **Linear-quadratic systems may have 0, 1 or 2 solutions.**
- **Quadratic-quadratic systems may have 0, 1, 2 or infinite solutions.**

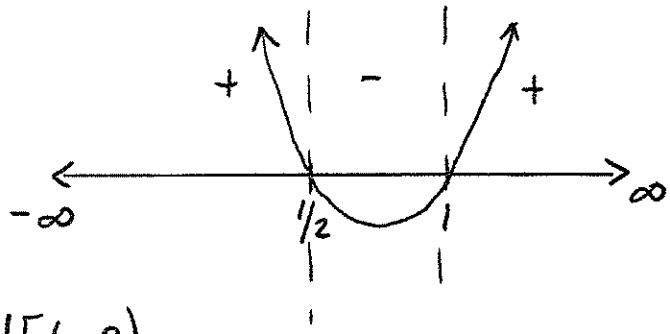
1. Solve: $2x^2 - 3x + 1 \geq 0$

P 2
S -3
F -2, -1

$(2x-1)(x-1) \geq 0$

$x = \frac{1}{2}$ $x = 1$

$\therefore (-\infty, \frac{1}{2}] \cup [1, \infty)$



2. Graph: $3x - 7y \geq -21$

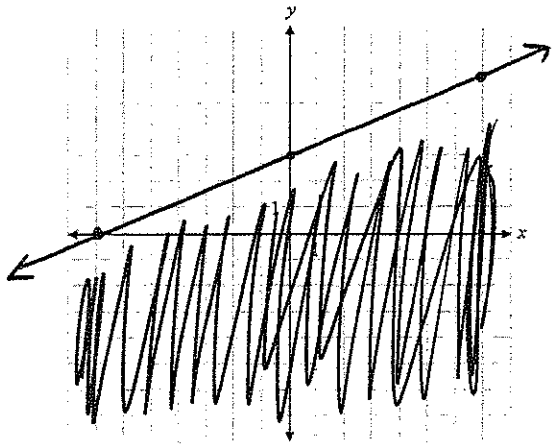
$\frac{3x}{7} + \frac{21}{7} \geq \frac{7y}{7}$

$\frac{3}{7}x + 3 \geq y$

Test (0,0)

$3(0) - 7(0) \geq -21$

$0 \geq -21$, True



3. Graph: $y < 2(x-3)^2 - 5$

V(3, -5)

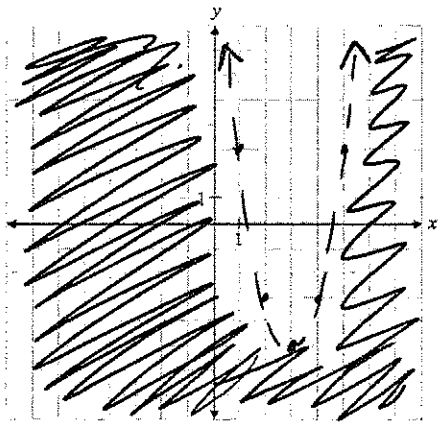
Test (0,0)

$0 < 2(0-3)^2 - 5$

$0 < 2(9) - 5$

$0 < 18 - 5$

$0 < 13$, True



4. Solve Algebraically: $y = 3x + 2$
$y = 4x^2 + 3x + 1$

$3x + 2 = 4x^2 + 3x + 1$

$0 = 4x^2 - 1$

$0 = (2x+1)(2x-1)$

$x = -1/2 \quad x = 1/2$

$y = 3(-1/2) + 2$

$= \frac{-3}{2} + \frac{4}{2}$

$= \frac{1}{2}$

$y = 3(1/2) + 2$

$y = 3/2 + 4/2$

$y = 7/2$

$\therefore \left(\frac{-1}{2}, \frac{1}{2}\right)$ and $\left(\frac{1}{2}, \frac{7}{2}\right)$

5. Solve by graphing: $y = x^2 + 5$
$y = -x^2 + 7$

$\therefore (-1, 6)$ and $(1, 6)$