8.1 Solving Systems of Equations -- Graphing Method

A system of equations has 2 (or more) equations with 2 variables (or more

We are interested in finding points that are solutions of both equations (the system solution)

Ex a Is (0, 0) a solution of the system below? Is (1, 3) a solution?

$y = 3x$

$y = -x + 4$

Test (0,0)

$0 = 3(0)$ yes

$0 = -0 + 4$ no

} not a system solution ← state explicitly → Is a system solution

Test (1,3)

$3 = 3(1)$ yes

$3 = -(1) + 4$ yes

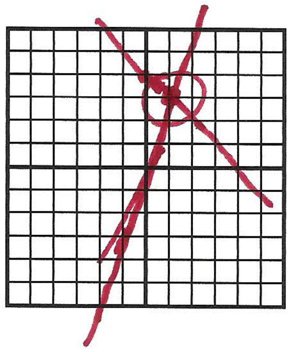
3 possible outcomes (3 kinds of systems)

1. The 2 lines intersect at one point

   $y = 3x$

   $y = -x + 4$

   - one solution(s)
   - system is consistent (has solution)
   - equations are independent



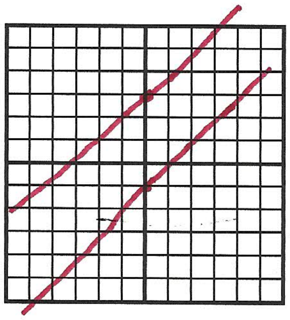
Solution: (1,3) lies on both lines

2. The 2 lines never intersect

   $y = x - 1$

   $y = x + 3$

   - no solution(s)
   - system is inconsistent
   - equations are independent



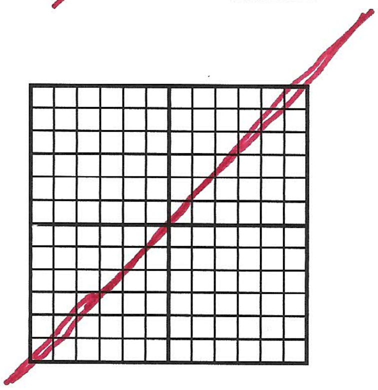
Solution: no sol.

3. The 2 lines lie on top of each other

   $y = x$

   $3x - 3y = 0$

   - infinitely many solution(s)
   - system is consistent
   - equations are dependent



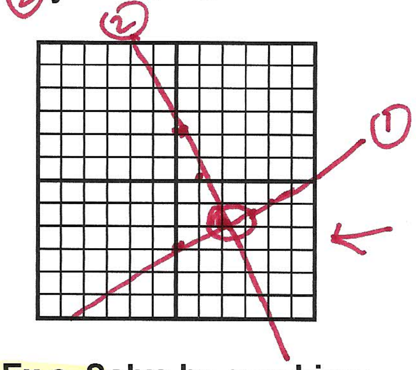
Solution: $\{(x, y) \mid y = x\}$

The most common (and expected) outcome is one solution

Ex b Solve by graphing:

① $y = \frac{1}{2}x - 3$

② $y = -2x + 2$

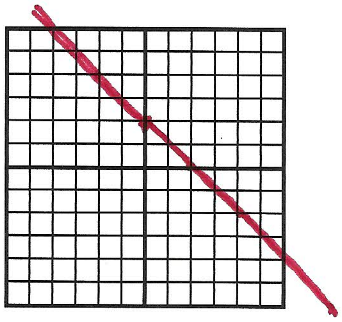


$(2, -2)$

Ex c Solve by graphing:

① $3x + 3y = 6$

② $y = -x + 2$



Infinitely many solutions

$\{(x, y) \mid y = -x + 2\}$