Distinct or Coincident Lines   Feb 17/2010

Ex.1. Solve $y = 2x + 3$ and $2x - y - 7 = 0$.

①   ②

Sub ① into ②

$2x - (2x+3) - 7 = 0$

$2x - 2x - 3 - 7 = 0$

$0x - 10 = 0$

$0x = 10$ ← impossible!

∴ there is no value of x that works

∴ there is no solution (zero solutions)

⟶ parallel lines.

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Ex.2. Write a linear system with:

a) infinitely many solutions

$y = x + 9$

$y = x + 9$

same slope & intercept

* might look different

$y = x + 9$

$-2x + 2y = 18$

b) no solution

$y = 3x + 5$ ①

$y = 3x + 7$ ②

same slope different y-intercept

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What does the algebra look like when this happens?
Solve each system by substitution.

a) infinitely many solutions

$$y = x + 9 \quad \text{①}$$
$$-2x + 2y = 18 \quad \text{②}$$

sub ① into ②

$$-2x + 2(x+9) = 18$$
$$-2x + 2x + 18 = 18$$
$$0x = 0 \quad \longleftarrow \text{always true!}$$

∴ there are an infinite number of solutions
→ lines are the same.

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b) no solution

See Ex. 1.

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When solving a linear system algebraically:

Exactly One Solution:
     - you can find the value of one of the variables
        and then solve for the other.

No Solution:
     - you end up with an untrue statement.
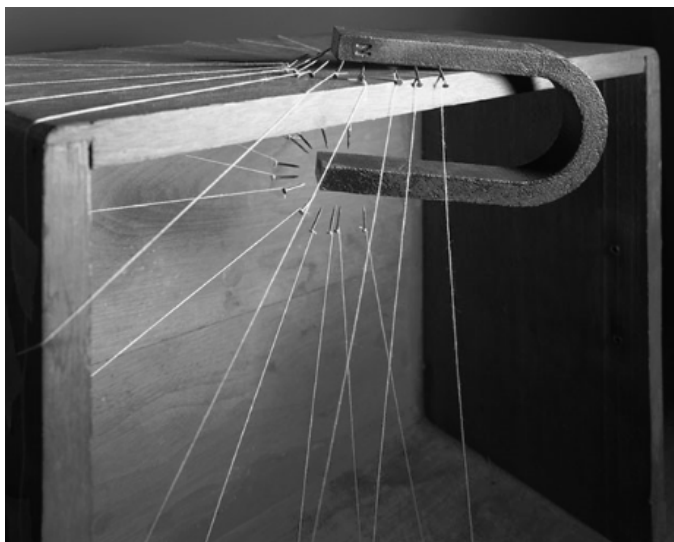   e.g. $0x = 2$ is <u>never</u> true

Infinitely Many Solutions:
     - you end up with $0x = 0$, which is true for any
        value of x.

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Assigned Work:
p. 92 # 7cef, 8cfghi, 9, 10, 12efgh, 13*

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