

Systems of Linear Equations



PART 1: INTRODUCTION

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What is a System of Linear Equations?

Suppose I am buying Apples, Oranges, and Pears.

- If I purchase
 - 3 Apples, 5 Oranges, and 2 Pears, the total comes to 2.10.
 - 5 Apples, 1 Oranges, and 4 Pears, the total comes to 1.80.
 - 4 Apples, 4 Oranges, and 4 Pears, the total comes to 2.40.
- How much does an Apple cost? An Orange? A Pear?



Solving Linear Equations

- Let's find the price of Apples and Oranges when

3 Apples plus 5 Oranges cost 1.70

5 Apples plus 1 Orange cost 1.00

How much does each Apple cost?

How much does each Orange cost?



Four Techniques

- Substitution
- Graphical
- Matrix Algebra
- Cramer's Rule



Substitution

➤ Substitution

- Graphical
- Matrix Algebra
- Cramer's Rule

Solving a Linear Equation using Substitution



$$B = 1.00 - 5A$$

from the 2nd equation

$$3A + 5(1.00 - 5A) = 1.70$$

from the 1st equation

$$3A - 25A + 5.00 = 1.70$$

$$-22A = -3.30$$

$$A = -3.30 / -22 = 0.15$$

$$5 \times 0.15 + 1B = 1.00$$

$$1B = 1.00 - 5 \times 0.15$$

$$B = 1.00 - 0.75 = 0.25$$



Graphical Technique

- ✓ Substitution
- Graphical
- Matrix Algebra
- Cramer's Rule



Graphing

$$3A + 5B = 1.70$$

$$5A + 1B = 1.00$$



1. Solve for 1 variable in terms of the other

$$B = 1.70/5 - 3A/5$$

$$B = 1.00 - 5A$$

2. Plot graphs of each equation



Graphing the Solution



$B = 1.70/5 - 3A/5$

$B = 1.00 - 5A$



Four Techniques Reviewed

- ✓ Substitution
- ✓ Graphical
- ✓ Matrix Algebra
- ✓ Cramer's Rule



Thank You!



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