# 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 1.705 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

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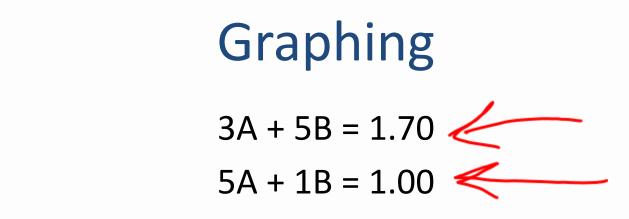
#### Solving a Linear Equation using Substitution

```
from the 2<sup>nd</sup> equation
B = 1.00 - 5A
3A + 5(1.00 - 5A) = 1.70
                                           from the 1<sup>st</sup> 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

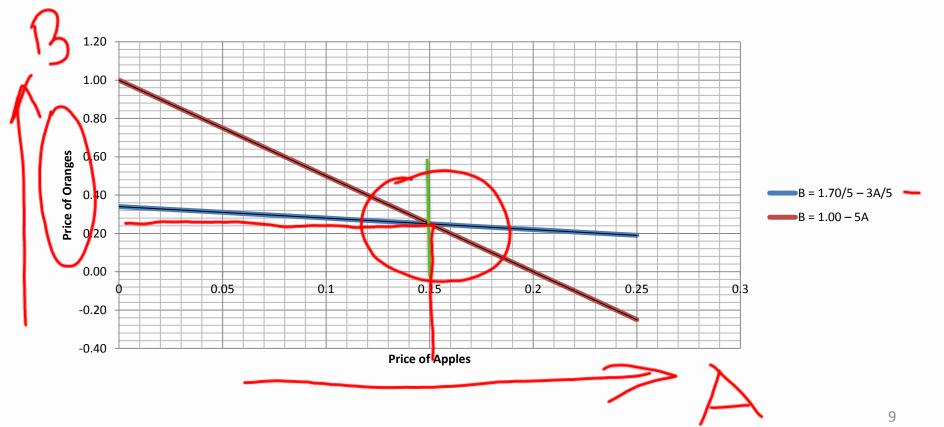
- Matrix Algebra
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1. Solve for 1 variable in terms of the other B = 1.70/5 - 3A/5 B = 1.00 - 5A

2. Plot graphs of each equation

### **Graphing the Solution**



#### Four Techniques Reviewed

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

#### Thank You!



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