Introduction to Math for Political Scientists

J. Alexander Branham

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Arithmatic

Let's start real slow...

- So we all know that

$$2 + 2 = 4$$

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- So we all know that

$$2 + 2 = 4$$

- But addition and subtraction have some rules

Properties of Addition and subtraction

- Communiciative:

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  - $a \pm b = b \pm a$
- Associative
  - $(a \pm b) \pm c = a \pm (b \pm c)$

Multiplication

- Multiplication - I have these 4 things 10 times.

```
4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4
```

```
## [1] 40
```

Multiplication

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```
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```

```
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Multiplication

- Multiplication - I have these 4 things 10 times.

```
4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4
```

```
## [1] 40
```

Or I could just do

```
4 * 10
```

```
## [1] 40
```

Division

- Just fancy multiplication.

Division

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Division

- Just fancy multiplication.
- I have these four things one of ten times.

```
4 * (1 / 10)
```

```
## [1] 0.4
```

Properties of Multiplication and Division

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  - $a * b = b * a$

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  - $(ab)c = a(bc)$

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Properties of Multiplication and Division

- Communicative
  - $a * b = b * a$
- Associative
  - $(ab)c = a(bc)$
- Distributive
  - $a(b + c) = ab + ac$
  - Note that this works for division: $\frac{a+b}{c} = \frac{a}{c} + \frac{b}{c}$

Properties of Equalities

Relationships that hold with (real) numbers

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- $a = b \longleftrightarrow b = a$ (Symmetric relationships)
- $a = b$ and $b = c \Rightarrow a = c$ (Transitive relationships)
    - $a > b$ and $b > c \Rightarrow a > c$

PEMDAS

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- Parentheses

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- Parentheses
- Exponents

PEMDAS

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- Exponents
- Multiplication and division (left tor right)

PEMDAS

- Parentheses
- Exponents
- Multiplication and division (left tor right)
- Addition and subtraction (left to right)

$$(10 - 48 \div 12 * 2)^2 + 3^2 * (8 - 6)$$