



**DSFA**  
Spring 2019

# Lecture 11

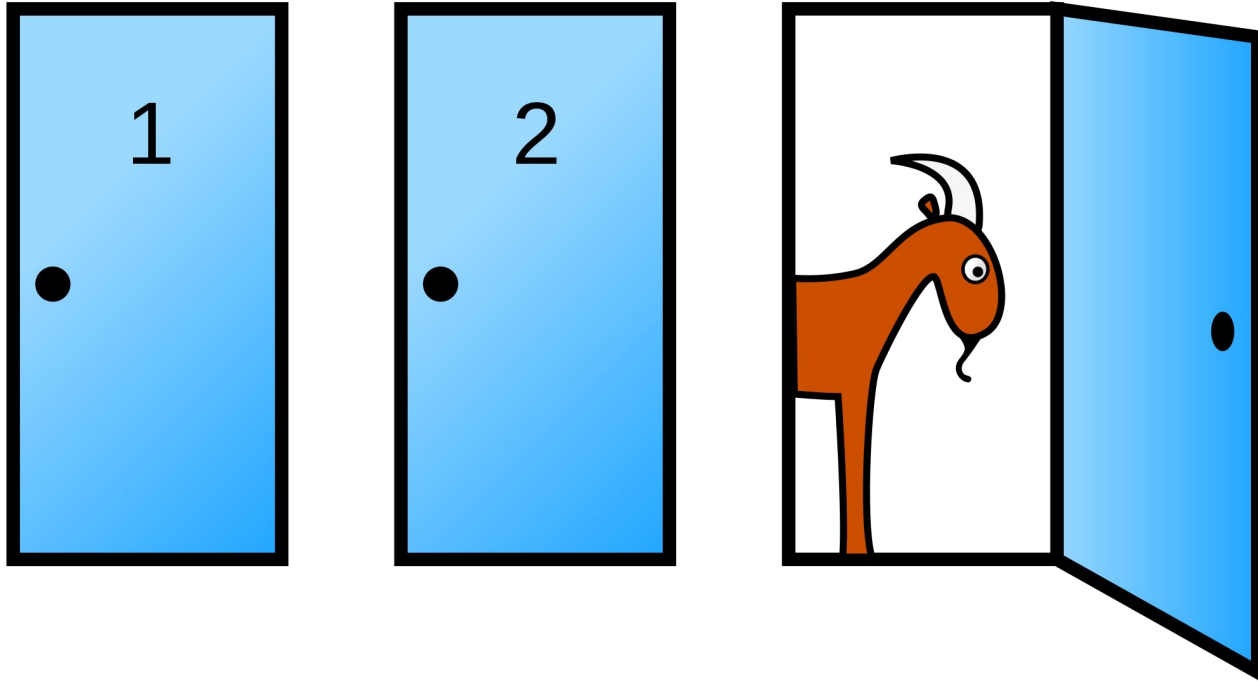
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Comparison and Control Statements

# The Monty Hall Problem

# Monty Hall Problem

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- 
- A. Switch?
  - B. Stay?
  - C. Doesn't matter
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# Comparison

# Comparison Operators

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The result of a comparison expression is a **bool** value

`x = 2`

`y = 3`

Assignment statements

`x > 1`

`x > y`

`y >= 3`

`x == y`

`x != 2`

`2 < x < 5`

Comparison  
expressions

(Demo)

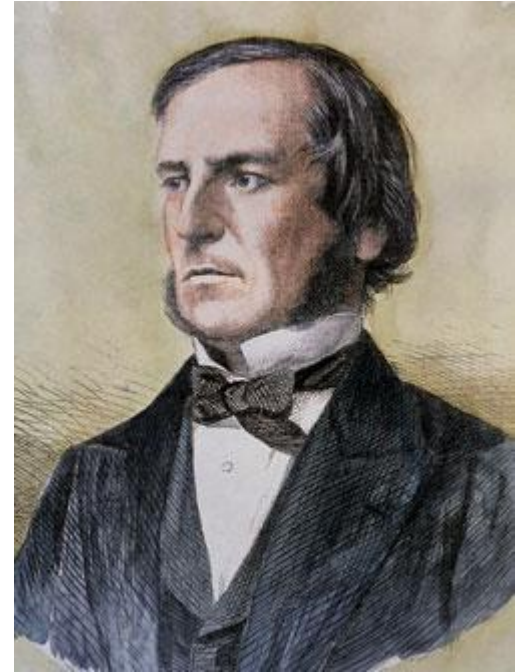
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# George Boole

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## *The Laws of Thought* (1854)

No general method for the solution of questions in the theory of probabilities can be established which does not explicitly recognise, not only the special numerical bases of the science, but also those **universal laws of thought which are the basis of all reasoning**, and which, whatever they may be as to their essence, are at least mathematical as to their form.



# Combining Comparisons

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Boolean operators can be applied to `bool` values

`a = True`      `b = False`

Evaluate to True

`not b`      `a or b`      `a and not b`

`a and b`      `not (a or b)`      `b and b`

Evaluate to False

(Demo)

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# Aggregating Comparisons

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Summing an array or list of bool values will count the True values only.

```
1      + 0      + 1      == 2
```

```
True + False + True == 2
```

```
sum([1, 0, 1]) == 2
```

```
sum([True, False, True]) == 2
```

(Demo)

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# Random Selection

# Random Selection

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## `np.random.choice`

- Selects at random
- with replacement
- from an array
- a specified number of times

```
np.random.choice(some_array, sample_size)
```

(Demo)

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# Discussion Question

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```
d6 = np.arange(1, 6+1)
```

What results from evaluating the following 2 expressions?  
Are they the same? Do they describe the same process?

```
np.random.choice(d6, 1000) + np.random.choice(d6, 1000)
```

```
2 * np.random.choice(d6, 1000)
```

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# Control Statements

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These statements *control* the sequence of computations that are performed in a program

- The keywords **if** and **for** begin control statements
- The purpose of **if** is to define computations that can choose different behaviors
- The purpose of **for** is to perform a computation for every element in a collection

(Demo)

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