

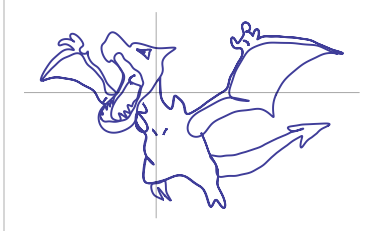
MATH:1260 Pokémath

The Mathematics of Pokémon Go[®]

Week 2 Wednesday, Spring 24

Popular curve:

Aerodactyl-like curve



Plan for Today

- Size of a Set
 - Counting abstract and in diagrams
 - Double Count Error
- Starting on Pokémon Stats

Class Reminders

- GW2 in discussion Thursday.
- HW2 due Wednesday (by 11:59 PM).

Counting

Definition

The **size** of a set is the number of elements in the set.

Notation

$n(A)$

Example

$\mathcal{U} = \{\text{Pokemon} \mid \text{in my bag}\}$

$H = \{\mathcal{U} \mid \text{Hatched from eggs}\}$

$K = \{\mathcal{U} \mid \text{From Kanto}\}$

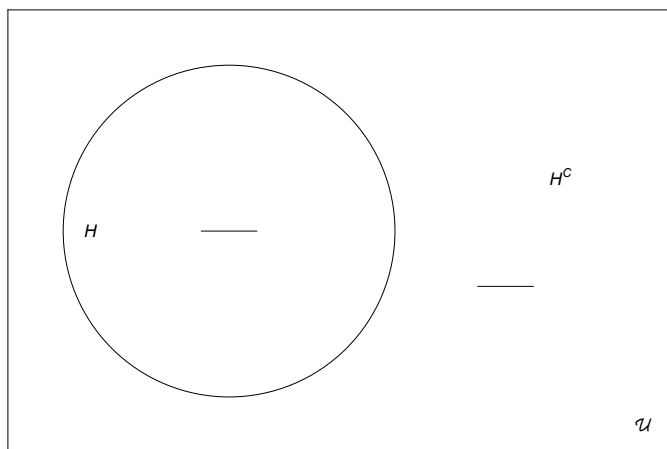
How do we find the count of each of these?



$$n(H^c) =$$

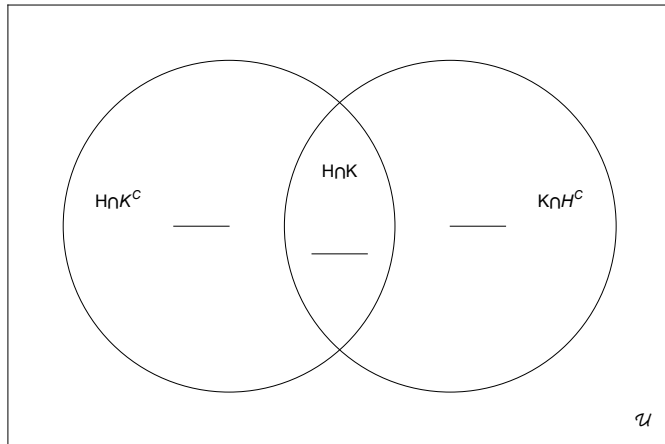
$$\text{In general? } n(A^c) =$$

(this is true for finite sets. For sets with ∞ elements, size is tricky)



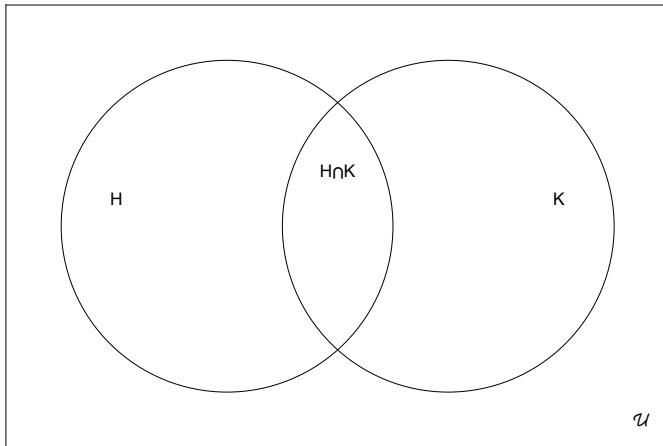
$$n(H \cap K) =$$

in general?



$$n(H \cup K) =$$

In general? $n(A \cup B) =$



Now you Try!

$\mathcal{U} = \{\text{Pokemon} \mid \text{in your bag}\}$

$N = \{\mathcal{U} \mid \text{Normal Type}\}$

$C = \{\mathcal{U} \mid \text{Pokemon was caught within 5 km}\}$

Use your pokemon bag and advanced searching to find:

$n(N)$

$n(N^C)$

$n(C)$

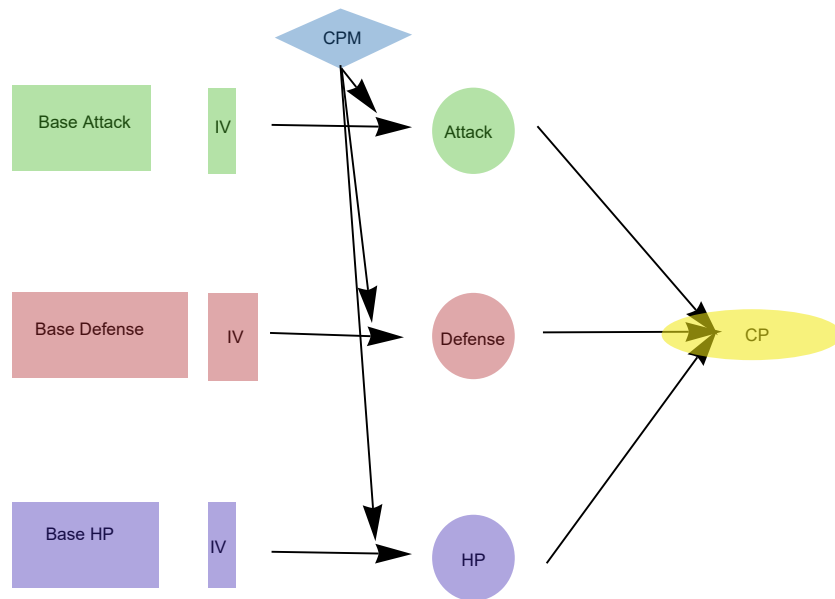
$n(N \cap C)$

$n(N \cup C)$

The Double Counting Error

Let's say we have 37 Pokemon. 25 of them are Grass Type. 14 of them have CP above 1000. 6 are both Grass Type and have CP above 1000. How would we draw a Venn Diagram of this situation and fill in the numbers in each region?

Now that we can sort and organize our Pokemon, let's get into stats!



Functions

The arrows in the diagram above represent functions. What are functions?

Definition

A **function** consist of a **set** of inputs called the **domain**, a **set** of outputs called the **range** and a rule by which each input determines exactly one output.

Notation: Ways functions can be defined

Tables and charts

Example: [https://bulbapedia.bulbagarden.net/wiki/List_of_Pokémon_by_base_stats_\(GO\)](https://bulbapedia.bulbagarden.net/wiki/List_of_Pokémon_by_base_stats_(GO))

Formulas or calculation instructions

name of function (input) = directions of what to do to the input

$$f(x) = 2(x - 4)$$

$$g(x) = x^2$$

$$h(x) = 7$$

Descriptions

If you input a type, the function outputs the most recent Pokemon you caught with that type.

If you input a Pokemon from your bag, the function outputs the CP of that Pokemon.

The following is a description that looks like a function, but isn't. Can you spot what's wrong?

If you input a Pokemon from your bag, the function outputs the Type of that Pokemon.

Top Hat

Find Pokemon's Base Stats: a function example

Example: [https://bulbapedia.bulbagarden.net/wiki/List_of_Pokémon_by_base_stats_\(GO\)](https://bulbapedia.bulbagarden.net/wiki/List_of_Pokémon_by_base_stats_(GO))




142		Aerodactyl	190	221	159
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Domain for the function?


Range for the function?

Key Point!

Each input gives a single output. Does that change how you defined your domain?

006		Charizard	186	223	173
006MX		Charizard (Mega Charizard X)	186	273	213
006MY		Charizard (Mega Charizard Y)	186	319	212

But it is still a function if different inputs give the same output!

129		Magikarp	85	29	85
349		Feebas	85	29	85

Visualization?

<https://www.kaggle.com/lakshyaag/data-visualization-pokemon-data>

This is a bar graph of the number of pokémon® in the pokédex (generation 1-6) of each type.

