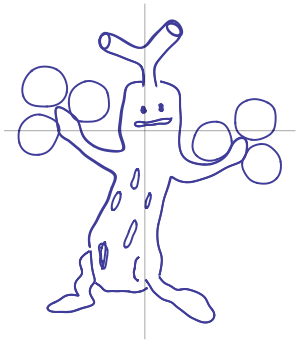
MATH:1260 Pokémath
The Mathematics of Pokémon Go®

Week 9 Wednesday, Spring 24

Popular curve:

Sudowoodo-like curve



Plan for Today

- Module 2: Gotta Catch 'em All®
  - Statistics: The study of probabilities

Class Reminders

- HW 6 due tonight at midnight.
- Project 2 Stage 1 due tonight at midnight.
- Project 2 Stage 2 due March 27 at midnight.
- GW8 in discussion Tomorrow.
  - Bring a computer, we're doing Excel!

Statistics

Statistics is the study of data.

Two main types: Descriptive and Inferential.

Descriptive: Organize, Display, Describe a data set. → graphs

Inferential: Draw conclusions about an underlying population using a data set. → research

Recall the catch data we used for Pikipek for GW 6.

We could compute the average of the number of balls to catch. That would be descriptive.
We could use the data to estimate the underlying catch probability. That would be inferential.

Average or Mean

Suppose I am trying to catch, Swinub. Swinub is Ground/Ice type. I have the platinum medal for Ground and the gold medal for Ice.

For Gold, Medal=1.3

For Platinum, Medal=1.4

→ part of multiplier in P(Catch)

- `Medal` is based on the player's type-specific Medals pertaining to the wild Pokémon's type and is
  - 1 if none
  - 1.1 if bronze
  - 1.2 if silver
  - 1.3 if gold
  - 1.4 if 20px platinum
  - if the wild Pokémon has two types, `Medal` will be the average of the above for each type

Average of 1.4 and 1.3?

$$\frac{1.4 + 1.3}{2} = 1.35$$

Average or Mean

One measure for the “center” of data is the average or the mean.

Notation: $\overline{x}$ → x-bar

Definition: The average or mean of x_1, x_2, x_3 ... x_n is

$$\overline{x} = \frac{x_1+x_2+x_3+\ldots+x_n}{n}$$

the total number of data points we have

Note: Scientists switch between using average and mean based on how they were taught. You will see both, so I will use both!

Average or Mean

Rayquaza

My advisor Dr. M caught 6 Rayquaza one weekend. They have IV sums of 40, 38, 41, 40, 37, and 39

What is the mean IV sum for the Rayquaza she caught?

$$\frac{40+38+41+40+37+39}{6} = 39.1\overline{6}$$

Zapdos

My advisor also has many Zapdos. They have IV sums of 37, 40, 37, 36, 36, 43, and 38.

What is the average IV sum for the Zapdos she caught? What can it tell us about the data?

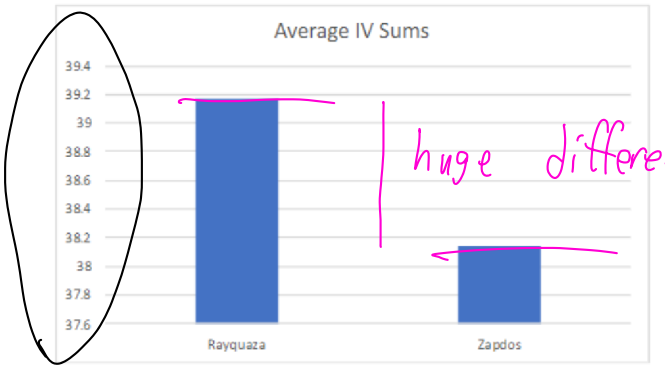
$$\frac{37+40+37+36+36+43+38}{7} = 38.14$$

TopHat: I have several Sudowoodo. The CPs of the Sudowoodo are 398, 583, 1081, and 698. What is the Average CP of my Sudowoodo?

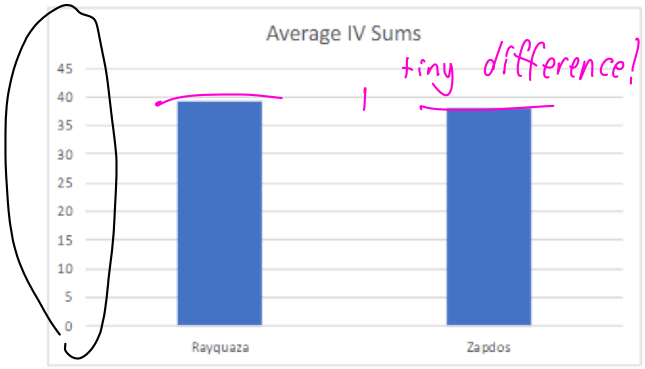
$$\frac{398+583+1081+698}{4} = 690$$

Average or Mean

Means are often plotted as a bar graph. What is the difference between these two?



same data different graphs



Standard Deviation

Let's say the average IV sum of the Moltres in my advisor's bag is 40. What can you say about each individual Moltres? Can you say anything about how many Moltres there are?

Nothing! No!

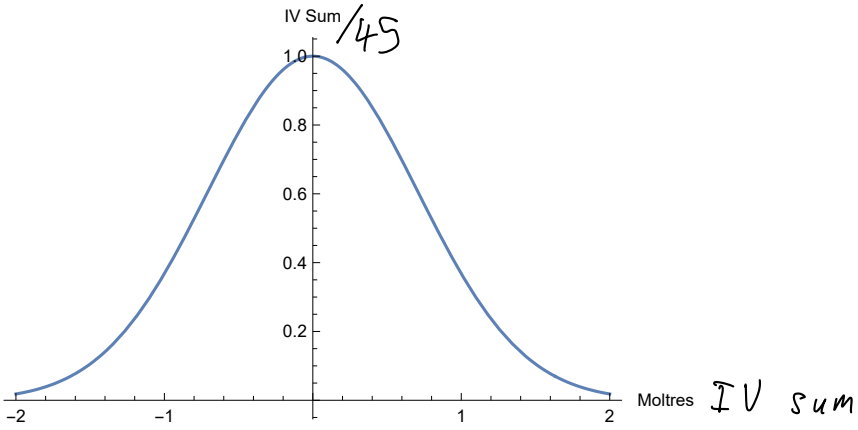
Case 1: 40

Case 2: 35 45

Case 3: 35 45 40 40

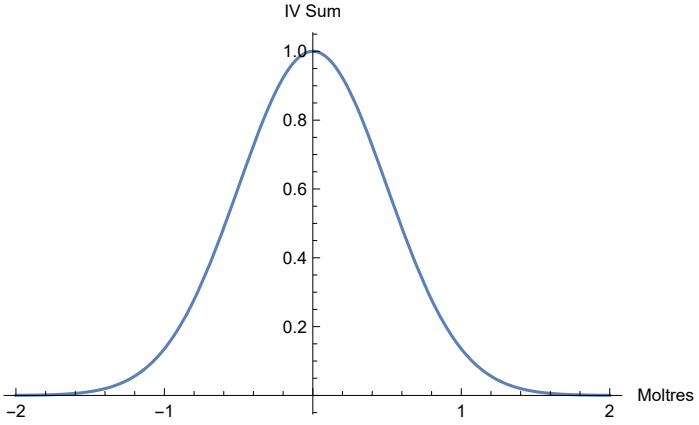
Standard Deviation

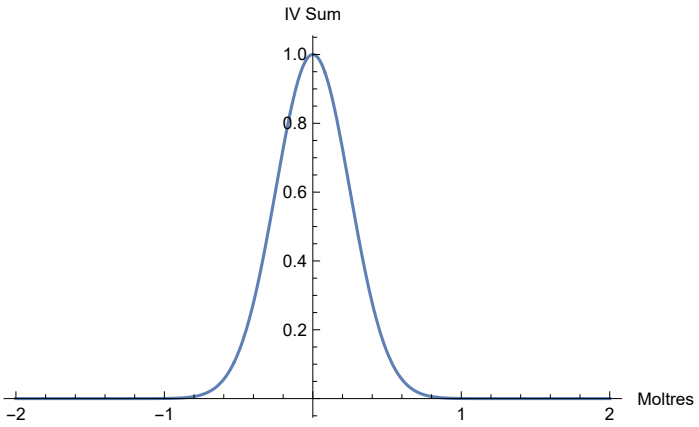
The standard deviation of a data set describes how far away the data points are from the mean.

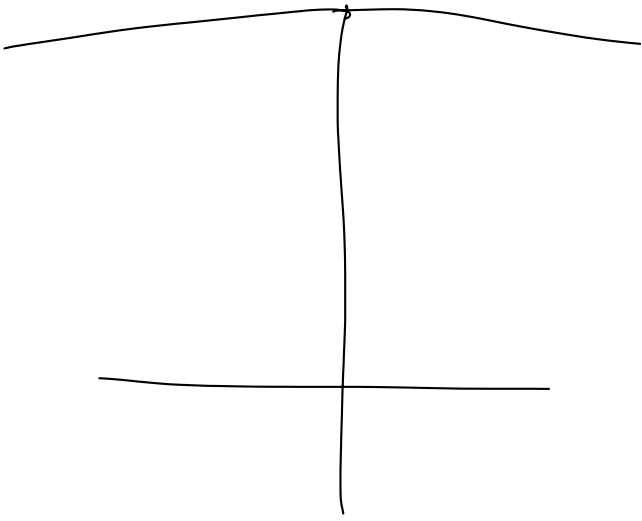


/45

IV sum







Standard Deviation

The formula for standard deviation is complicated, so we can let the computer do it. We'll have Excel calculate standard deviation tomorrow in GW.

Correlation

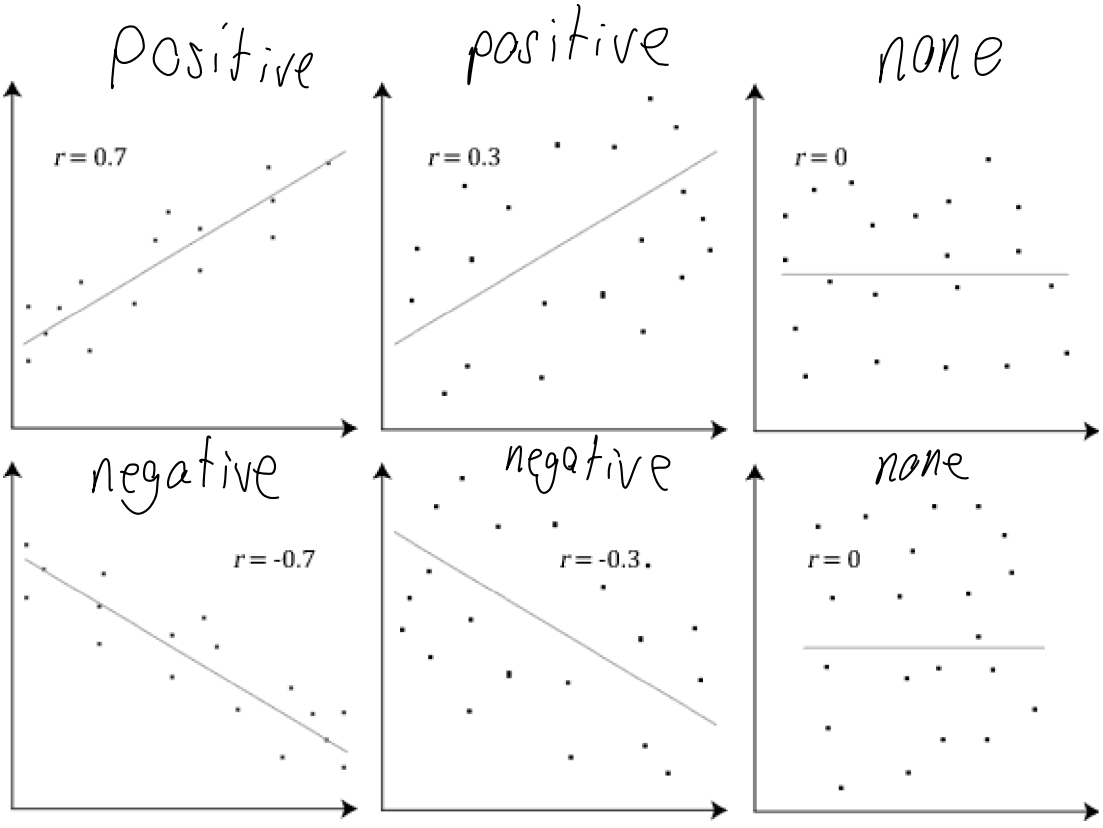
Intuition (we already did this for project 1!)

A correlation is a relationship between two variables:

If when one is high, the other is more likely to be high, we say they have a positive correlation.

If when one is high, the other is more likely to be low, we say they have a negative correlation.

If knowing one is high doesn't tell you if the other will be high or low, we say they have zero correlation.



The variable "r" is a measure of how correlated the two variables are.