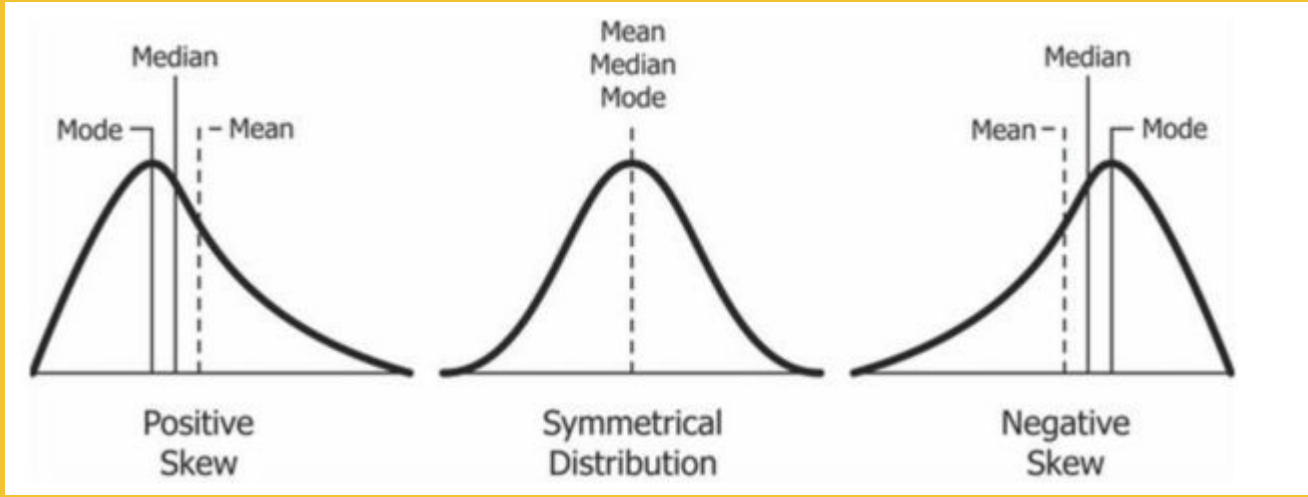


Econ 2250: Stats for Econ

Source for pic stats above.

What we will do today?

- Something that we discussed last time?
- Probability rules
  - Work through https://ethanweed.github.io/pythonbook/04.02-probability.html via colab
  - First section of https://mixtape.scunning.com/02-probability_and_regression

Today’s materials

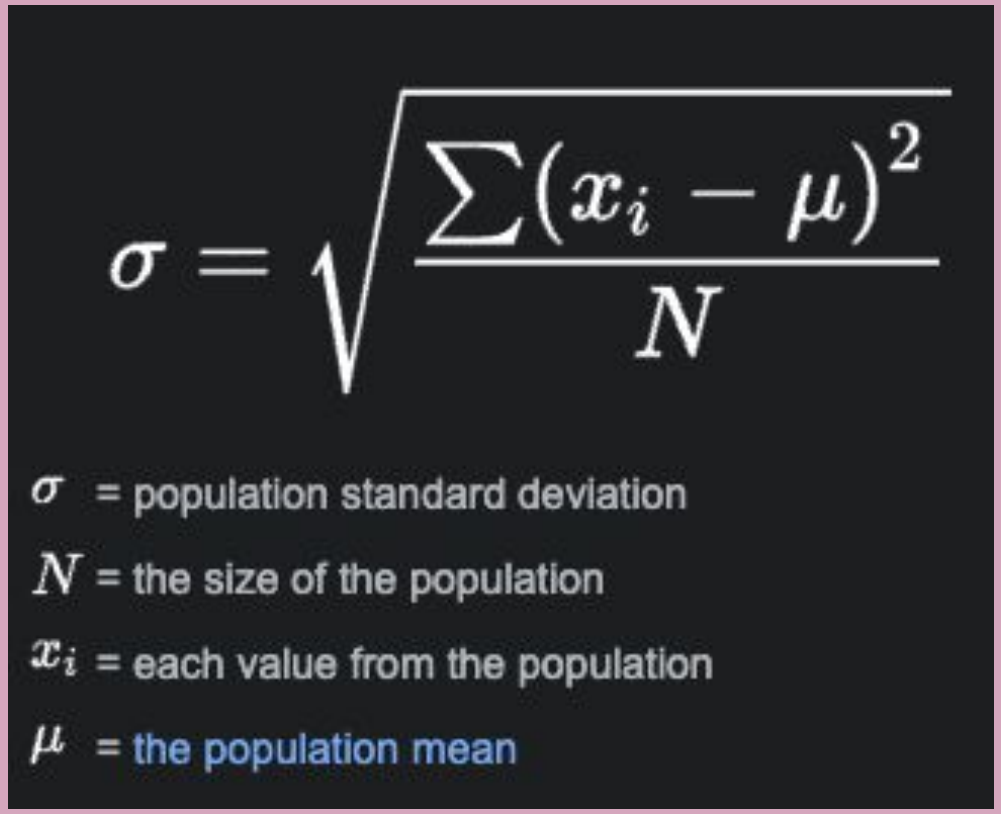
https://colab.research.google.com/github/jonkrohn/ML-foundations/blob/master/notebooks/5-probability.ipynb#scrollTo=hKciO43C5ChT

Words, words, words

- elementary event: each draw will only be one event
- sample space: list of all possible events
- independent event: $P(A|B) = P(A)$
- joint probabilities: $P(A,B) = P(A)P(B)$

Equations

Review: Standard Deviation



Code:

Likelihood of event

$$P(\text{event}) = \frac{\#\text{ of outcomes of event}}{\#\text{ of outcomes in } \Omega}$$

Basic Rules

$$P(A \text{ and } B) = P(A \cap B) = P(A)P(B).$$

For example, if two coins are flipped, then the chance of both being heads is ½ * ½ = 1/4

$$P\left(A \text{ or } B\right) = P(A \cup B) = P\left(A\right) + P\left(B\right) - P\left(A \text{ and } B\right).$$

For example, when drawing a card from a deck of cards, the chance of getting a heart or a face card (J,Q,K) (or both) is 13/52 + 12/52 - 3/52 = 11/26

Summary of probabilities

Event	Probability
A	$P(A) \in [0,1]$
not A	$P(A^\complement) = 1 - P(A)$
A or B	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $P(A \cup B) = P(A) + P(B)$ if A and B are mutually exclusive
A and B	$P(A \cap B) = P(A\|B)P(B) = P(B\|A)P(A)$ $P(A \cap B) = P(A)P(B)$ if A and B are independent
A given B	$P(A \mid B) = \frac{P(A \cap B)}{P(B)} = \frac{P(B\|A)P(A)}{P(B)}$

Combinatorics

Code:

$$\binom{n}{k} = \frac{n!}{k!(n-k)!}$$

Exercise

Does everyone feel that they have at very least the tools needed for the homework?

End of class form

https://forms.gle/8uYs1QCL8D7yt29b9