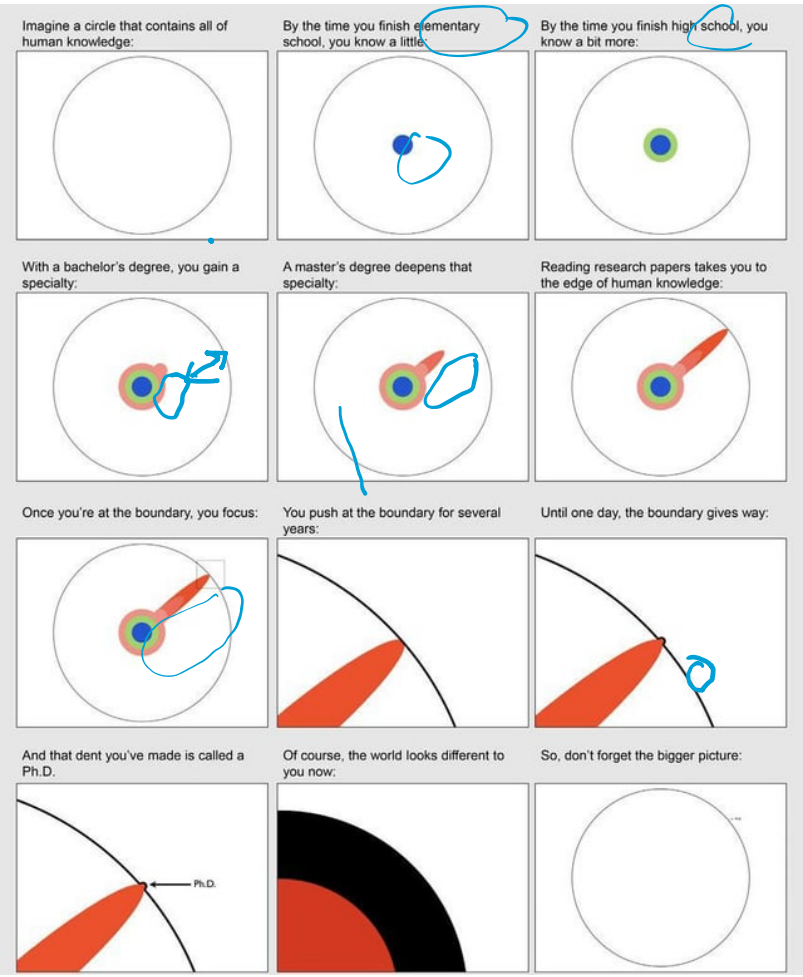
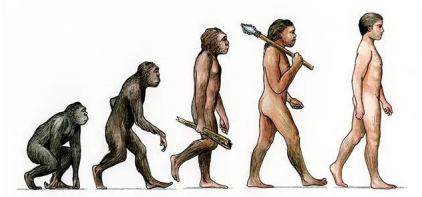
Real Analysis in Stat 641 (Iowa State)

Wednesday, June 26, 2024 3:06 PM





More than just a catchy phrase, “ontogeny recapitulates phylogeny” is the foundation of recapitulation theory. Recapitulation theory posits that the development of individual organisms (ontogeny) follows (recapitulates) the same phases of the evolution of larger ancestral groups of related organisms (phylogeny). Feb 10, 2017

New York Botanical Garden
https://www.nybg.org › blogs › science-talk › 2017/02

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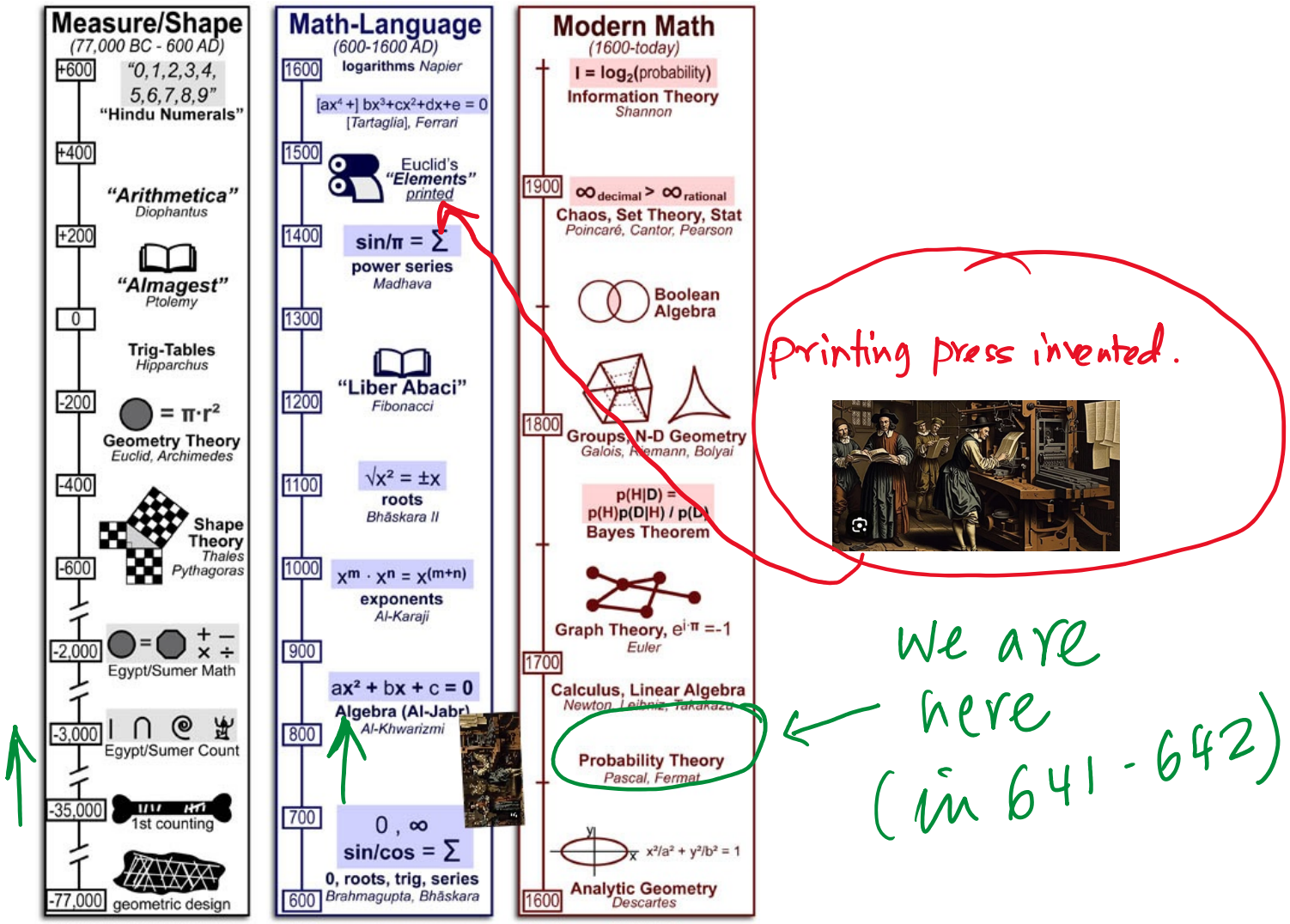

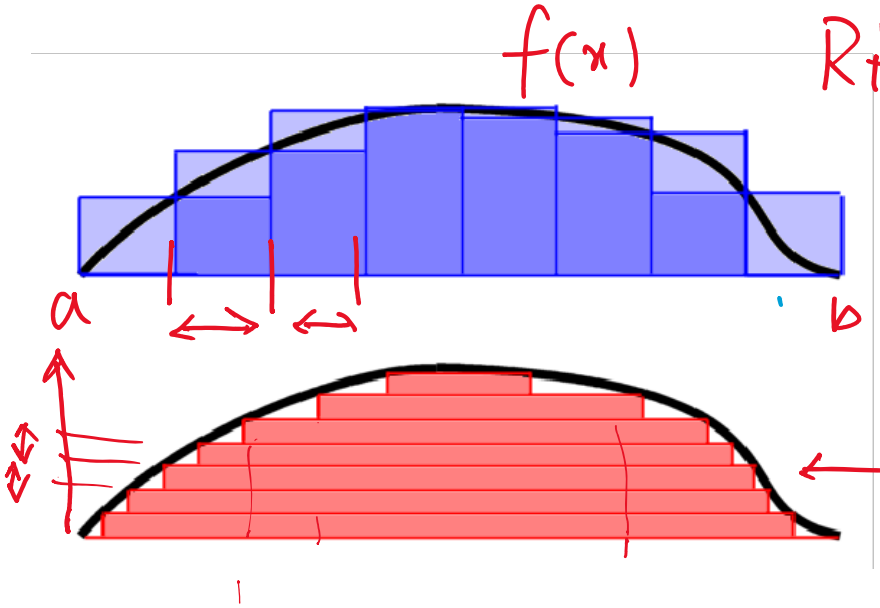

Riemann integral (usual)

$$\int_a^b f(x)\,dx$$

Lebesgue integral $\int f\,d\lambda$

λ : lebesgue meas.

Last: With measure Theory, we will understand" these statements more clearly. $(\Omega, \mathcal{F}, P)$ $(\mathbb{R}, \mathcal{B}(\mathbb{R}))$

Theorem 5.5.9 (Strong Law of Large Numbers) *Let $X_1, X_2, \ldots$ be iid random variables with ~~EX_i~~ $= \mu$ and $\text{Var } X_i = \sigma^2 < \infty$, and define $\bar{X}_n = (1/n)\sum_{i=1}^n X_i$. Then, for every $\epsilon > 0$,*

$$P(\lim_{n\to\infty} |\bar{X}_n - \mu| < \epsilon) = 1; \quad \Leftrightarrow$$

$P(\{\omega : \lim_{n\to\infty} |\bar{X}_n(\omega) - \mu| = 0\}) = 1$

$P\left(\lim_{n\to\infty} |\bar{X}_n - \mu| = 0\right) = 1$

or $X_n - \mu \to 0$ a.e (P)

that is, $\bar{X}_n$ converges almost surely to μ.

Usual text for 641
https://www.amazon.com/Measure-Theory-Probability-Springer-Statistics/dp/038732903X

Classic reference for analysis (advanced calculus):

https://www.google.com/search?client=opera&q=analysis+rudin&sourceid=opera&ie=UTF-8&oe=UTF-8