***COURSERA: STATS W/ R SPECIALIZATION***

***COURSE 1 - Introduction to Probability and Data***

**WEEK 3 - Introduction to Probability**

* **Random process** 🡪 know what outcomes *could* happen but not which particular one *will* happen
* Ex: coin toss, die roll, shuffle on music player, stock market
* Sometime helpful to model process as random even if it truly isn’t so
* P(A) = probability of event A
* Several different interpretations of probability, but almost all agree on mathematical rule that 0 <= P(A) <= 1
* **Frequentist interpretation =** a **relative frequency =** proportion of times an outcome would occur if we ran the process an infinity number of times
* **Bayesian interpretation** = **subject degree of belief** = for same event, 2 people could have different viewpoints + as such assign different probabilities to it
* Allows for prior info to be integrated into the inferential framework
* Largely popularized by revolutionary advances in computation technology + methods in past 20 years
* **Law of Large Numbers =** as more observations are collected, proportion of occurrences of a particular outcome converges to the probability of that outcome (1/2 for coin toss, 1/6 for die roll)
* Would be more surprised to see 3 heads in 100 coin flips compared to 10, + even more so for 1k flips
* **Independence** 🡪 coin toss P(H on toss 10) = P(H on toss 11) 🡪 coin is not **due** a heads
* Common misunderstanding of law of large numbers = **Law of Averages (Gambler’s fallacy:** random processes are supposed to compensate for what happened in the past (I’m due a good roll/hand/spin, etc.)
* But say you get 100’s of heads in a row on a coin flip, coin is most likely not fair

**Disjoint Events + General Addition Rule**