<u>Chapter 6</u>

-Approaches to Assigning Probabilities:

- <u>Classical approach</u>: based on equally likely events
- <u>Relative frequency</u>: assigning probabilities based on experimentation or historical data
- <u>Subjective approach</u>: assigning probabilities based on the assignor's judgment (ex: weather forecast)

-Complement of an event: 1 – P(event occurring)
-Joint probability: intersection of events (A and B)
-Union of two events: event containing all sample points in A or B or both.
-Mutually Exclusive Events: two events cannot occur together (joint probability is 0); no points in common a= 2, b = 5
-Marginal probabilities: computed by adding across rows and down columns; calculated in the margins

	B_1	B_2	P(A)
A_1			
A_2			
P(B)			1.00

-Conditional probabilities: used to determine how two events are related = $P(A|B)=\frac{P(A\wedge B)}{P(B)}$

-Independence: $P(A|B)=P(A)$
-Multiplication Rule: $P(A\wedge B)=P(A|B)\cdot P(A)$
-Addition Rule: P(A or B) = P(A) + P(B) – P(A and B)

<u>Chapter 7</u>
-Discrete Random Variable: one that takes on a **countable** number of values
-Continuous Random Variable: one whose values are **not countable**. Ex: time (30.1 minutes, 30.10000001 minutes, etc.)

Discrete Probability:
-represent a **population** so use describe them using various parameters:

$E(X)=\mu=\sum xP(x)$: weighted average/population mean

$V(X)=\sigma^2=\sum ¿¿$ **OR** $\sigma^2=\sum x^2P(x)-\mu^2$: variance

$\sigma=\sqrt{\sigma^2}$: standard deviation

Laws of Expected Value:
E(c)= c
E (X + c) = E(x) + c
E(cX) = cE(X)

Laws of Variance:
V(c) = 0
V(X + c) = V(X)
V(cX) = c^2V(X)

Bivariate Distributions:
-Covariance: COV(X,Y) = $\sum x\sum y\,xyP(x,y)-\mu_x\mu_y$

-Coefficient of Correlation: $\rho=\frac{COV(X,Y)}{\sigma_x\sigma_y}$

-Laws:
E(X + Y) = E(X) + E(Y)
V(X + Y) = V(X) + V(Y) + 2COV (X,Y)   If X and Y are independent, COV(X, Y) = 0 and thus V(X + Y) = V(X) + V(Y)

Binomial Random Variable: counts the number of successes in n trials of the binomial experiment.

$$P(X)=\frac{n!}{x!(n-x)!}p^x¿$$

Binomial Distribution:

$\mu=np$

$\sigma^2=np(1-p)$

$\sigma=\sqrt{np(1-p)}$

Poisson Experiment: discrete probability distribution that refers to the number of events (successes) within a specific time period or region of space (number of flaws in cloth, number of accidents in one day on a particular highway, etc.)

P(x) = $\frac{e^{-\mu}\mu^x}{x!}$

Chapter 8

Continuous Random Variables

-Probability Density Functions

f(x) = 1/b-a where a </ x </ b

example: P(2500 </ x </ 3000) = (3000-2500) x 1/b-a

-Normal Distribution: bell shaped and symmetrical around the mean

- Z = X – mean/ standard deviation

-Exponential Distribution: $\lambda e^{-\lambda x}$ x >/ 0

-Student t distribution: v(nu) = degrees of freedom and gamma is k value

-Chi-square distribution is not symmetrical

-F Distribution: density function, which has 2 v's and degrees of freedom in numerator and denominator

Chapter 9

Sampling Distribution: distribution created by sampling

Mean = μ Variance = σ^2/n Standard deviation = σ/√n $Z = \frac{xbar - \mu}{\sigma / \sqrt{n}}$

Central Limit Theorem:

-Sampling distribution of the mean of a random sample drawn from any population is approximately normal for sufficiently large sample size (30)

-If the population is normal, then xbar is normally distributed for all values of n

If it is non-normal then it is approximately normal for only larger values of n.

Example:

P(Xbar > 32) = $P\left(\frac{xbar - \mu}{\sigma} > \frac{expected - mean}{standard\ deviation}\right)$ = P(Z > #)

Sampling Distribution of a Proportion

-Count the number of successes in a sample and compute: Phat = X/n

μ = np σ= √p(1-p)/n (Square root of whole thing)

Phat is the standard error of proportion