Formula Sheet

for **Final Exam** (ch1-12) Natural Stats (mth24100)

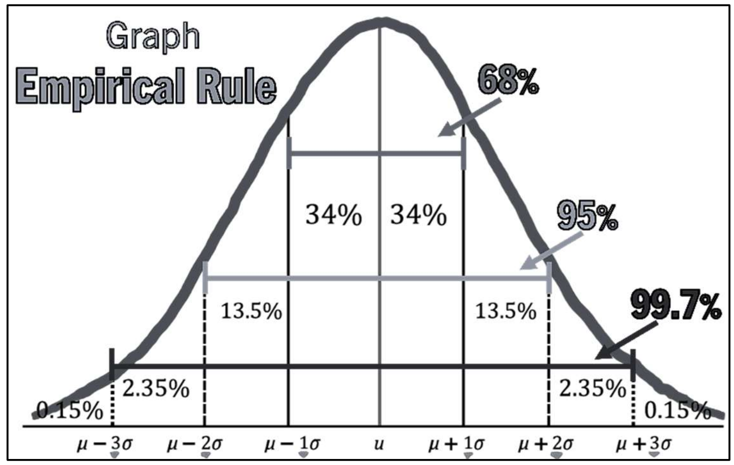
Let A and B be events. Then $P(A \cup B) = P(A) + P(B) - P(A \cap B)$; $P(A \mid B) = \dfrac{P(A \cap B)}{P(B)}$

If E and F are Independent, then $P(E \cap F) = P(E) * P(F)$ Combination n choose r: ${}_nC_r$

If E and F are Mutually Exclusive (disjoint), then $P(E \cap F) = 0$ Permutation n choose r: ${}_nP_r$

	Mean	Variance/ St. Dev.
Population	$\mu = \dfrac{\sum X}{N}$	$\sigma^2 = \dfrac{\sum (X-\mu)^2}{N}$
Sample	$\bar{x} = \dfrac{\sum X}{n}$	$s^2 = \dfrac{\sum (X-\bar{x})^2}{n-1}$
Probability Distribution	$\mu = \sum X * P(X)$	$\sigma^2 = \sum X^2 * P(X) - \mu^2$
Binomial Distribution	$\mu = np$	$\sigma = \sqrt{np(1-p)}$
Poisson Distribution	$\mu = \lambda$	$\sigma^2 = \lambda$
Uniform Distribution	$\mu = \dfrac{c+d}{2}$	$\sigma = \dfrac{d-c}{\sqrt{12}}$
Sample Mean Normal Distribution	$\mu_{\bar{x}} = \mu$	$\sigma_{\bar{x}} = \dfrac{\sigma}{\sqrt{n}}$
Sample Proportion Normal Distribution	$\mu_{\hat{p}} = p$	$\sigma_{\hat{p}} = \sqrt{\dfrac{p(1-p)}{n}}$

$\boldsymbol{\beta}$	0.80	0.85	0.90	0.95	0.98	0.99
$\boldsymbol{\alpha}$	0.20	0.15	0.10	0.05	0.02	0.01
$\boldsymbol{Z_{\alpha/2}}$	1.282	1.440	1.645	1.960	2.326	2.576



Population z_score: $z = \dfrac{X-\mu}{\sigma}$; Sample: $z = \dfrac{X-\bar{x}}{s}$

Interquartile Formulas: $IQR = Q_3 - Q_1$; Lower Fence $= Q_1 - 1.5(IQR)$; Upper Fence $= Q_3 + 1.5(IQR)$

Sample Size for CI: $n = \left(Z_{\alpha/2}\dfrac{\sigma}{E}\right)^2$; $n = p(1-p)\left(\dfrac{Z_{\alpha/2}}{E}\right)^2$; $n_1 = n_2 = \dfrac{(Z_{\alpha/2})^2(\sigma_1^2+\sigma_2^2)}{(\text{SE})^2} \overset{\text{or}}{=} \dfrac{(Z_{\alpha/2})^2\left(p_1(1-p_1)+p_2(1-p_2)\right)}{(\text{SE})^2}$

Calculator:

Data Analysis: **1 − Var Stats** $\underbrace{L_1}_{data}$, $\underbrace{L_2}_{frequency}$

Linear Reg: $\mathbf{LinReg}(ax+b)$ $\underbrace{L_1}_{x-list}$, $\underbrace{L_2}_{y-list}$; $s^2 = \dfrac{SSE}{n-2}$; Hyp Test for $\hat{\beta}_1$ **LinRegTTest**; Conf Int for $\hat{\beta}_1$ **LinRegTInt**

Binomial Distribution: $P(X = k) =$ **binompdf**(n, p, k), $P(X \le k) =$ **binomcdf**(n, p, k)

Poisson Distribution: $P(X = k) =$ **Poissonpdf**(λ, k), $P(X \le k) =$ **Poissoncdf**(λ, k)

Uniform Distribution: uniformly distributed on $[c, d]$, $P(a \le X \le b) = \dfrac{b-a}{d-c}$

Normal Distribution: $P(a \le X \le b) =$ **normalcdf**(a, b, μ, σ)

Inverse Normal: Find $\boldsymbol{k}$ so that $P(X \le \boldsymbol{k}) = prob$. Then, $\boldsymbol{k} =$ **invNorm**($prob$, μ, σ)

Multiple Mean Comparison: **ANOVA**($L_1, L_2, L_3, \ldots$

	Population Mean, μ	Proportions, p	Pop. Mean Difference, $\mu_1 - \mu_2$	Proportions Difference, $p_1 - p_2$
Confidence Intervals	**ZInterval** *or* **TInterval**	**1-PropZInt**	**2-SampZInt** *or* **2-SampTInt**	**2-PropZInt**
Hypothesis Testing	***Z*-Test** *or* **T-Test**	**1-PropZTest**	**2-SampZTest** *or* **2-SampTTest**	**2-PropZTest**