Formula Sheet

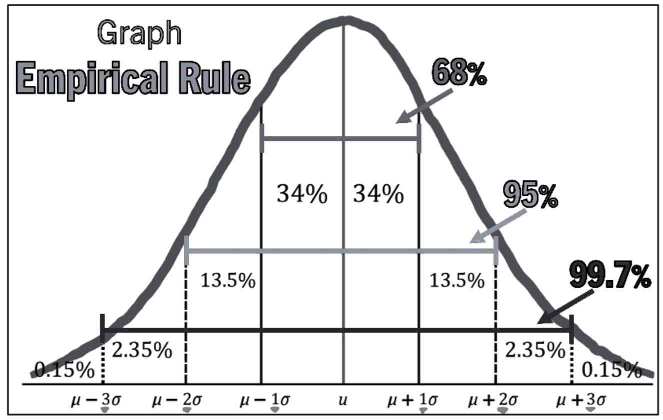
for Final Exam (ch1-12) Basic Stats (mth14100)

Let A and B be events. Then $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$; $P(A, \text{ given } B) = \frac{P(A \text{ and } B)}{P(B)}$; $P(A) = 1 - P(A^c)$

If E and F are Independent, then $P(E \text{ and } F) = P(E) * P(F)$; If E and F are Mutually Exclusive (disjoint), then $P(E \text{ and } F) = 0$

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

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



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

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

Smallest Sample Size for CI: for Population Mean $n = \left(Z_{\alpha/2}\frac{\sigma}{E}\right)^2$; for Population Proportion $n = p(1-p)\left(\frac{Z_{\alpha/2}}{E}\right)^2$

Excel Functions:

Mean value, $\bar{x}$ (or μ) **=AVERAGE**(cell: cell); Mode value **=MODE.MULT**(cell: cell)

Minimum value **=MIN**(cell: cell); Median value **=MEDIAN**(cell: cell); Maximum value **=MAX**(cell: cell)

Standard Deviation and Variance: σ **=STDEV.P**(cell: cell), σ^2 **=VAR.P**(cell: cell); and s **=STDEV.S**(cell: cell), s^2 **=VAR.S**(cell: cell)

k% percentile, P_k **=PERCENTILE.INC**(cell: cell, k%); Quartiles Q_1, Q_2, Q_3: Q_k **=QUARTILE.INC**(cell: cell, k)

Linear Regression: $\hat{y} = \mathbf{a}*x + \mathbf{b}$, where a **=SLOPE**($y\_data$, x_data), b **=INTERCEPT**(y_data, x_data)

The linear correlation coefficient is r **=CORREL**(y_data, x_data)

Binomial Distribution: $P(X = k)$ **=BINOM.DIST**(k, n, p, 0), $P(X \le k)$ **=BINOM.DIST**(k, n, p, 1)

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

Normal Distribution: $P(X \le k)$ **=NORM.DIST**(k, μ, σ, 1)

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

$\frac{value}{value}$	=$value$ / $value$
$value^2$	=$value$ ^**2**
$\sqrt{value}$	**=SQRT**($value$)

	Confidence Interval	Hypothesis Test
Population Mean, μ	***Z-Interval:*** $\bar{x} \pm z_{\alpha/2} * \frac{\sigma}{\sqrt{n}}$ OR $(\bar{x} - \epsilon, \ \bar{x} + \epsilon)$ where ϵ **=CONFIDENCE.NORM**(1-β, σ, n)	***Z -Test:*** $z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}}$ If <, use p **=NORM.S.DIST**(z, 1) If >, use p =1 − **NORM.S.DIST**(z, 1) If ≠, use p =2*(1 − **NORM.S.DIST**(**ABS**(z), 1))
	T-Interval: $\bar{x} \pm t_{\alpha/2} * \frac{s}{\sqrt{n}}$ OR $(\bar{x} - \epsilon, \ \bar{x} + \epsilon)$ where ϵ **=CONFIDENCE.T**(1-β, s, n)	***T -Test:*** $t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$ If <, use p **=T.DIST**(t, $n-1$, 1) If >, use p **=T.DIST.RT**(t, $n-1$) If ≠, use p **=T.DIST.2T**(**ABS**(t), $n-1$)
Population Proportion, *prop*	***Z -Interval:*** $\hat{p} \pm z_{\alpha/2} * \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$ OR $(\hat{p} - \epsilon, \ \hat{p} + \epsilon)$ where ϵ **=CONFIDENCE.NORM**(1-β, $\sqrt{\hat{p}(1-\hat{p})}$, n)	***Z -Test:*** $z = \frac{\hat{p} - p_0}{\sqrt{(p_0(1-p_0)/n}}$ If <, use p **=NORM.S.DIST**(z, 1) If >, use p =1 − **NORM.S.DIST**(z, 1) If ≠, use p =2*(1 − **NORM.S.DIST**(**ABS**(z), 1))