WILLIAM D. LAW, JR. LEARNING COMMONS

Statistics formulas for STA 2023 and STA 2122

Z-Score for Sample Values and Population Values

Z = $\frac{x-\bar{x}}{s}$	Z = $\frac{X-\mu}{\sigma}$

Standard Deviation for Sample Values and Population Values

Sample Standard Deviation, s = $\sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$	Population Standard Deviation, $\sigma = \sqrt{\frac{\sum(x-\mu)^2}{N}}$

Sampling Distribution for a Sample Proportion

$\hat{p} = \frac{x}{n}$	$\mu_{\hat{p}} = p$	$\sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}}$	Z = $\frac{\hat{p}-p}{\sqrt{\frac{p(1-p)}{n}}}$
Central Limit Theorem Conditions ($\hat{p} \sim normal$)	1. SRS	2. np $\geq$ 10; and n(1-p) $\geq$ 10	3. N $\geq$ 10n

Sampling Distribution for a Sample Mean

$\bar{x} = \frac{\Sigma x}{n}$	$\mu_{\bar{x}} = \mu$	$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$	Z = $\frac{\bar{x}-\mu}{\frac{\sigma}{\sqrt{n}}}$
Central Limit Theorem Conditions ($\bar{x} \sim normal$)	1. SRS	2. n $\geq$ 30 or x ~ normal	

Confidence Intervals and Test Statistics for Hypothesis Testing

CI for μ, σ known	**CI for μ, σ unknown**	**CI for p**
C.I. = $\bar{x} \pm Z\frac{\sigma}{\sqrt{n}}$	C.I. = $\bar{x} \pm t\frac{s}{\sqrt{n}}$	C.I. = $\hat{p} \pm Z_c\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$
HT for μ, σ known	**HT for μ, σ unknown**	**HT for p**
Z = $\frac{\bar{x}-\mu}{\frac{\sigma}{\sqrt{n}}}$	t = $\frac{\bar{x}-\mu}{\frac{s}{\sqrt{n}}}$	Z = $\frac{\hat{p}-p}{\sqrt{\frac{p(1-p)}{n}}}$

Confidence Interval Critical Values of Z

Confidence	**Z_c**	**Confidence**	**Z_c**
90%	1.645	98%	2.33
95%	1.96	99%	2.576 or 2.58

Regression line equation y = ax + b, a= slope of the line, b = the y-intercept, residual= y - $\hat{y}$; r= correlation coefficient (-1 $\leq$ r $\leq$ 1), r^2= coefficient of determination

Binomial Distribution: $\mu = np$; $\sigma = \sqrt{np(1-p)}$;

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Discrete Probability Distribution: $\mu = \Sigma[X \cdot P(X)]$; $\sigma = \sqrt{\sum[(x-\mu)^2 \bullet p(x)]}$

Probability: $nCr = \frac{n!}{r!(n-r)!}$; $nPr = \frac{n!}{(n-r)!}$; $P(A \cup B) = P(A) + P(B) - P(A \cap B)$; $P(A|B) = \frac{P(A \cap B)}{P(B)}$;
$P(A) + P(A^C) = 1$

Texas Instruments Calculator Shortcuts and Formulas

Descriptive Statistics: (Mean, Standard Deviation, Minimum, Q1, Median, Maximum):

- insert data in calculator STAT → Edit
- Then: STAT→ CALC→1: 1-Vars Stat
- To clear a list: STAT→ Edit→ go up to the list name (L1, L2, L3...)--> CLEAR→ Enter
- Restore missing list name: STAT→ Edit → go up→ 2^{nd} Del→ type the name→ enter

Linear Regression:

- Correlation coefficient (one-time set up): 2^{nd} 0 → DiagnosticOn→Enter→ Enter
- Insert values of X into List1 and values of Y into List2→ STAT→ Edit
- Then: STAT→ CALC→4: LinReg(ax + b) → 2^{nd}→1→ comma→ 2^{nd}→ 2→ enter
- Or: STAT→CALC→8: linReg (a + bx)→ 2^{nd} → comma→2^{nd}→ 2→ enter

Intervals:

- Stat→ TESTS→ 1: Z-Test
- Stat→ TESTS→ 2:T:Test
- STAT→ TESTS→ 4:2-SampT-Test
- STAT→ TESTS→ 5: 1propZ-Test
- STAT→ TESTS→ A: 1propZ-Interval

Hypothesis Test:

- STAT→ TESTS→ 1: Z-test
- STAT→ TESTS→ 2: T-Test
- STAT→ TESTS→ 4: 2-SampT-Test
- STAT→ TESTS→ 5: 1propZ-Test

Distributions:

- 2^{nd}→ VARS→ 2: normalcdf (left bound, right bound, Mean, Standard Deviation)
- 2^{nd} → VARS→ 3: invNorm (area to the left, Mean, Standard Deviation)
- 2^{nd}→ VARS→ 5: tcdf (left bound, right bound, degrees of freedom)
- 2^{nd}→ VARS→ 0: binomialpdf(number of trials, probability of success, number of successes)
- 2^{nd}→ VARS→ A:Binomcdf(number of trials, probability of success, number of successes)

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