**TI 83 / TI 84 Calculator Tips for Statistics**

**Descriptive Statistics**
To find the mean, standard deviation, median, Q₁ & Q₃: first enter data into a list:
Start – Edit – scroll up to top of list till L₁ is highlighted, press clear, scroll down, enter data, 2nd Quit.
Then enter Stat, Calc, 1-Var Stats, 2nd L₁ or appropriate list #.
Example: given the following data: {1, 3, 7, 9}, determine the mean, standard deviation and variance.
Answer: mean = 5, std dev = 3.651483717, variance = 13.3333333334 (note: to get variance, square the standard deviation)

**Counting Principles**
Combination: \( C(n, r) \) (n objects taken r at a time; order doesn’t matter.)
Enter “n”, Math, PRB, \( n \text{Pr} \), “r”, “enter”.
Permutation: \( P(n, r) \) (n objects taken r at a time; order does matter.)
Enter “n”, Math, PRB, \( n \text{Pr} \), “r”, “enter”.
Factorial: \( ! \) (n objects arranged in order)
Enter Math, PRB, !, “enter”.
Examples: How many ways can 7 books be arranged on a bookshelf?
Enter “7”, Math, PRB, !, “enter”.
Answer: 5040
A horse race has 12 entries. Assuming that there are not ties, in how many ways can these horses finish first, second, and third?
Enter “12”, Math, PRB, “3”, “enter”.
Answer: 1320

**Binomial Probability**
Binomial Rules:
1. 2 outcomes
2. Fixed # of trials
3. Probabilities are constant
4. Events are independent
\( P = \text{probability of success} \)
\( Q = \text{probability of failure} \)
\( N = \text{number of trials} \)
To find \( P(x=#) \):
2nd Vars – “binompdf”enter (n, p, x)
To find \( P(x\leq #) \):
2nd Vars – “binomcdf” enter (n, p, x)
Examples: Find the probability of getting 7 heads in 10 flips of a coin.
2nd Vars – “binompdf” (10, 0.5, 7)
Answer: 0.1171875
Find the probability of getting at least 7 heads in 10 flips of a coin. \( P(x \leq 6) \)
1 -2nd Vars – “binomcdf” (10, 0.5, 6)
Answer: 0.171875

**Normal Probability**
To find a probability if a Z-score is known:
2nd Vars – “normalcdf” – enter “lower limit, upper limit”
Example: \( P(-0.9 < Z < 1.5) \)
Enter 2nd Vars – “normalcdf”, (-0.9, 1.50, enter.
Answer 0.7491326798
If given x-scores, mean & std. dev:
2nd Vars – “normalcdf” – “lower limit, upper limit, mean, std. dev.” If \( x > \#, \) use 999999 as upper limit. If \( X < \#, \) use –999999 as lower limit.
Example: \( P(40 < x < 71), \) mean = 60, std dev = 18
2nd Vars – “normalcdf” (40, 71, 60, 18) enter
Answer: 0.5961767383
To find z-scores when given cumulative probabilities:
2nd Vars – “invnorm” – enter (enter probability as decimal)
Example: Find z-score for \( P_{80} \).
2nd Vars – “invnorm” – (0.80) enter
Answer: 0.841612335
To find an x-value given percent wanted, mean, std dev:
2nd Vars – “invnorm” (% wanted, mean, std dev)
Example: Given mean = 500, std dev = 120, find \( Q_{1} \).
2nd Vars – “invnorm” (0.25, 500, 120)
Answer 419

**Confidence Intervals (1 – Sample)**
If you have raw data, first enter data into a list:
Stat – Edit – scroll up to top of list till L₁ is highlighted, press clear, scroll down, enter data, 2nd Quit.
**z-interval**: Stat – Tests – “t-interval” choose Data if you have raw data or Stat if you have statistical data, press enter, enter rest of info requested, press calculate.

**T-interval**: Stat – Tests – “t-interval” – choose Data if you have raw data or Stat if you have statistical data, press enter, enter rest of into requested, press calculate.

**1-PropZInt**: Stat – Tests – “1-PropZInt” Enter information requested, press “calculate”.

Example: Given n = 20, mean = 22.9, std dev = 1.5, find the 90% CI.

**Hypothesis Testing (1 Sample)**

If you have raw data, first enter data into a list: Stat – Edit – Scroll up to top of list till L1 is highlighted, press clear, scroll down, enter data, 2nd Quit.

**Z-Test**: Stat – Tests – “Z-Tests” choose Data if you have raw data or Stat if you have statistical data, press enter, enter rest of information requested, press “calculate”.

**T-Test**: Stat – Tests – “T-Test” choose Data if you have raw data or Stat if you have statistical data, press enter, enter rest of information requested, press “calculate”.

**1-PropZTest**: Stat – Tests – “1-PropZTest” enter data requested, press “calculate”.

Example: Use z – Test to test claim: \( \mu < 5.500, \alpha = 0.01, \bar{X} = 5.497, s = 0.011, n = 36 \)

Answer: \( p = 0.5 > \alpha \), therefore, fail to reject \( H_0 \).

**2-PropZTest**: Stat, Tests, 2 – PropZTest, enter statistical data requested, press “Calculate”.

**Example 1**: Claim: \( \mu_1 < \mu_2, \alpha = 0.01, \bar{X}_1, s_1, n_1, \bar{X}_2 = 1195, s_2 = 105, n_2 = 105 \)

Decide if you should reject or fail to reject the \( H_0 \), “Stat”, “Tests”, “2-SampZTest”, “Stats”, “enter”, \( \sigma_1 = 75, \sigma_2 = 105, \bar{X}_1 = 1225, n_1 = 35, \bar{X}_2 = 1195, n_2 = 105, \mu_1 < \mu_2 \), press “Calculate”.

Answer: \( p = 0.967 > \alpha \), therefore, fail to reject \( H_0 \).

**Example 2**: \( H_0: \mu_1 \geq \mu_2, \alpha = 0.10, \bar{X}_1 = 0.515, s_1 = 0.305, n_1 = 11, \bar{X}_2 = 0.475, s_2 = 0.215, n_2 = 9, \) Assume \( \sigma_1 = \sigma_2 \). Decide if you should reject or fail to reject the \( H_0 \).

“Stat”, “Tests”, “2-SampTTest”, “Stats”, “enter”, \( \bar{X}_1 = 0.515, s_1 = 0.305, n_1 = 11, \bar{X}_2 = 0.475, s_2 = 0.215, n_2 = 9, \mu_1 > \mu_2 \), Pooled: Yes, press “Calculate”.

Answer: \( p = 0.37 > \alpha \), therefore fail to reject \( H_0 \).

**Example 3**: Claim: \( p_1 \leq p_2, \alpha = 0.10, \bar{X}_1 = 344, x_2 = 304, n_2 = 800 \). Decide if you should reject or fail to reject the \( H_0 \).

“Stat”, “Tests”, “2-PropZTest”, \( x_1 = 344, n_1 = 860, x_2 = 304, n_2 = 800 \). Decide if you should reject or fail to reject the \( H_0 \).

“Stat”, “Tests”, “2-PropZTest”, \( x_1 = 344, n_1 = 860, x_2 = 304, n_2 = 800, p_1 < p_2 \), press “Calculate”.

Answer: \( p = 0.20 > \alpha \), therefore fail to reject the \( H_0 \).

**Linear Regression & Correlation**

Before calculating r, you must enter the Diagnostic On command.

2nd, 0 (catalog), “Diagnostic On”, enter, enter.

First enter raw data into a list: Stat – Edit – scroll up to top of list till L1 is highlighted, press clear, scroll down, enter data, 2nd Quit.

“Stat”, “CALC”, “LinReg (ax + b)”, 2nd, L1, or appropriate list # for x, 2nd, L2, or appropriate list # for y, enter. Output should look something like the following:

LinReg

\[ y = ax + b \]

where

\[ a = 11.8244078 \]

\[ b = 35.30117105 \]

\[ r^2 = 0.9404868083 \]

\[ r = \text{coefficient of determination} \]

\[ r = 0.967869912 \]

a = slope

b = y-intercept

\( r^2 \) = coefficient of determination

r = correlation coefficient