TOPIC: HYPOTHESIS TEST FOR CORRELATION COEFFICIENT

Hypothesis Test for Correlation Coefficient Using TI-84

◆ Recall: The corr. coeff. measures strength of correlation. A hyp. test can determine if the correlation is *significant*.

▶ To run a hypothesis test for the population corr. coeff. (ρ), use the **F:LinRegTTest** function.

▶ If testing "no correlation", ρ ___ 0; "positive correlation", ρ ___ 0; "negative correlation", ρ ___ 0.

EXAMPLE

A city's public health dept. is investigating whether poor air quality (high AQI) is associated with asthma-related ER visits. Use the data below to find the corr. coeff. & test whether the correlation is statistically significant using $\alpha = 0.01$.

$H_0: \rho =$ _____

$H_a: \rho$ **[≠ | < | >]** ___

$r =$ _____

P-value = _____

Air Quality Index vs Asthma ER Visits										
AQI	42	58	67	35	80	90	55	73	40	62
ER Visits	8	10	13	6	17	20	11	15	7	12

Because P-value **[< | >]** α, we **[REJECT | FAIL TO REJECT]** H_0,
So there is **[ENOUGH | NOT ENOUGH]** evidence to suggest there is a _____ linear correlation between air quality & asthma related ER visits.

HOW TO: Hyp Test for Correl. Coeff.

1) (STAT), **1:EDIT…**

   Enter data in **L1** & **L2**

2) (STAT) (>) **TESTS**

   (v) **F:LinRegTTest**

3) **Xlist:L1**
   Ylist:L2
   Freq:1
   β & ρ: ≠0 <0 >0
   Calculate

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PRACTICE

An economist wonders if the inflation rate is linearly correlated with the unemployment rate and is looking to use the results of their analysis for further study. They take a random sample of recent months and record the unemployment rate and inflation rate. They find $r = 0.23$ and run a hypothesis test, getting a P-value of 0.35. Interpret the value of r and the results of the test.

EXAMPLE

A psychologist is interested in whether increased time spent on hobbies reduces reported stress level, so she surveys 15 adults and gets the approximate time spent (in hours) per week on hobbies and has them rate their stress level (out of 10), receiving the following results:

Hobbies vs Stress Level														
Hobbies	5	10	8	9	7	5	8	7	4	6	5	4	8	9	6
Stress	8	2	5	3	5	6	4	6	9	7	8	10	3	5	7

(A) Find r and interpret.

(B) Perform a hypothesis test for ρ with a significance level of 0.05.

$H_0:$_____ $H_a:$_____ P-value: _____

Because P-value **[< | >]** α, we **[REJECT | FAIL TO REJECT]** H_0.
So there is **[ENOUGH | NOT ENOUGH]** evidence to suggest there is a _____ linear correlation between time spent on hobbies & reported stress level.

HOW TO: Hyp Test for Correl. Coeff.

1) (STAT), `1:EDIT…`

   Enter data in **L1** & **L2**

2) (STAT) (>) **TESTS**

   (v) **F:LinRegTTest**

3) `Xlist:L1`
   `Ylist:L2`
   `Freq:1`
   β & ρ: ≠0 **<0** >0
   Calculate

TOPIC: HYPOTHESIS TEST FOR CORRELATION COEFFICIENT

EXAMPLE

An HR manager is interested in whether the length of training (in days) an employee receives impacts the score they receive on their first performance review (out of 10). They collect the following data:

Length of Training vs Employee Score													
Training	9	10	3	4	7	10	8	7	6	6	5	4	8	9	6
Score	7	8	8	5	6	10	9	8	8	7	6	7	9	8	9

(**A**) Create a scatterplot. Does it seem possible that length of training and employee score are linearly correlated?

(**B**) Find r and interpret.

(**C**) Perform a hypothesis test for ρ with a significance level of 0.05.

H_0:_____ H_a:_____ P-value: _____

Because P-value **[< | >]** α, we **[REJECT | FAIL TO REJECT]** H_0.
So there is **[ENOUGH | NOT ENOUGH]** evidence to suggest there is a _____ linear correlation between time spent on training and employee score.

HOW TO: Hyp Test for Correl. Coeff.

1) (STAT), **1:EDIT…**

   Enter data in **L1** & **L2**

2) (STAT) (>) **TESTS**

   (v) **F:LinRegTTest**

3) **Xlist:L1**
   Ylist:L2
   Freq:1
   β & ρ: ≠0 <0 >0
   Calculate