LINEAR REGRESSION T TEST

This test is used to determine if there is a linear relationship between 2 quantitative variables in a population

Child development researchers explored the relationship between the crying of infants 4 to 10 days old and their later IQ scores. The number of peaks in the most active 20 seconds of crying were counted and recorded. The tables contain data from a random sample of 36 infants.

Cry	10	12	9	16	18	15	12	20	16	33	20	16
IQ	87	97	103	106	109	114	119	132	136	159	90	100

Cry	23	27	15	21	12	15	17	17	19	13	18	18
IQ	103	108	112	114	120	133	141	94	103	104	109	112

Cry	16	19	22	30	12	12	14	10	23	9	16	31
IQ	118	120	135	155	94	103	106	109	113	119	124	135

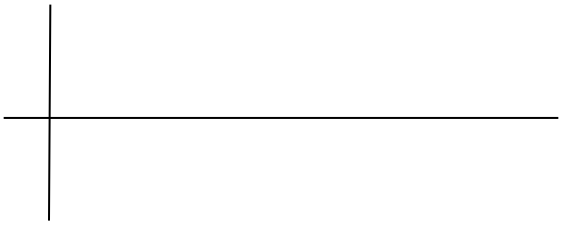
Do these data provide convincing evidence of a linear relationship between crying counts and IQ in the population of infants 4 to 10 days old?

DETERMINE IF THERE IS A LINEAR RELATIONSHIP FROM THE SAMPLE

1) Scatterplot (Cry Counts, IQ)

2) Calculate *r* and LSRL

3) Check residual plot for randomness



PERFORM TEST:

P) STATE POPULATION PARAMETER:

H) STATE HYPOTHESES:

A) VERIFY ASSUMPTIONS REQUIRED FOR TEST:

Linear

Independent

Normal

Equal variance

Random

T) PERFORM TEST:

a) Using Formula:

$$t = \frac{b}{SE_b} \text{ with } df = n - 2 \text{ where } SE_b = \frac{\sqrt{\frac{\Sigma(y_i - \hat{y})^2}{n-2}}}{\sqrt{\Sigma(x_i - \bar{x})^2}}$$

b) Using Minitab Output?

Predictor	**Coef**	**SE Coef**	**T**	**P**
Constant	87.9055	8.934	10.22	0.0000
Crycount	1.5517	0.4094	3.79	0.0005
s = 14.25	R-Sq = 29.8%		R-Sq (adj) = 28.5%	

c) Using Calculator:

S) STATE CONCLUSION:

CONFIDENCE INTERVAL

A 95% confidence interval for the true population slope can be found using:

a) Formula:

CI = $b \pm t^* SE_b =$

Table B $SE_b = \frac{b}{t}$

b) Calculator?

STAT → TESTS → Lin Reg T Interval = (.72, 2.38)

We are 90% confident that for every cry count, IQ increases between .72 and 2.38 points

Calculator Note:

H_0: $\beta = 0$ H_0: $\rho = 0$

rho (population correlation)

If $\beta = 0$, $\rho = 0$
$\beta > 0$, $\rho > 0$
$\beta < 0$, $\rho < 0$