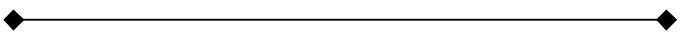
Correlation: a numerical indication of the strength and type of relationship between 2 variables



–1	0	1
Strong Negative Relationship	No linear Relationship	Strong Positive Relationship

Hypothesis Testing:

Null:	H_0: $\rho = 0$	There's no significant correlation between x and y.
Alternative:	H_1: $\rho \neq 0$	There's a significant correlation between x and y.

r can be used as an estimator of ρ if x and y are linearly related, the variables are random variables, and for any value of x, the y variable is normally or approximately normally distributed

Two methods for testing the null hypothesis—

1. Use Table A-5 with the sample size n and the α level.

2. Use Table A-3 with 2 tails, d.f. = n – 2 and the α level in mind.

   Compute the test statistic t. $$t = r\sqrt{\frac{n-2}{1-r^2}}$$

If you choose to reject the null hypothesis, there are 5 possibilities:

(1) There's a <u>direct cause and effect</u> relationship (e.g., water causes plants to grow, heat causes ice to melt, etc.).

(2) There's a <u>reverse cause and effect</u> relationship (e.g., excessive coffee causes nervousness – it may be that an extremely nervous person craves coffee to calm their nerves).

(3) The relationship can be caused by <u>a third variable</u> (e.g., the number of deaths due to drowning and the number of soft drinks consumed – heat and humidity).

(4) There may be a <u>complexity of interrelationships</u> among many variables (e.g., students' high school and college grades – IQ, hours of study, influence of parents, motivation, age, and instructors).

(5) The relationship may be <u>coincidental</u> (e.g., the number of people who are exercising and the number of people who are committing crimes).