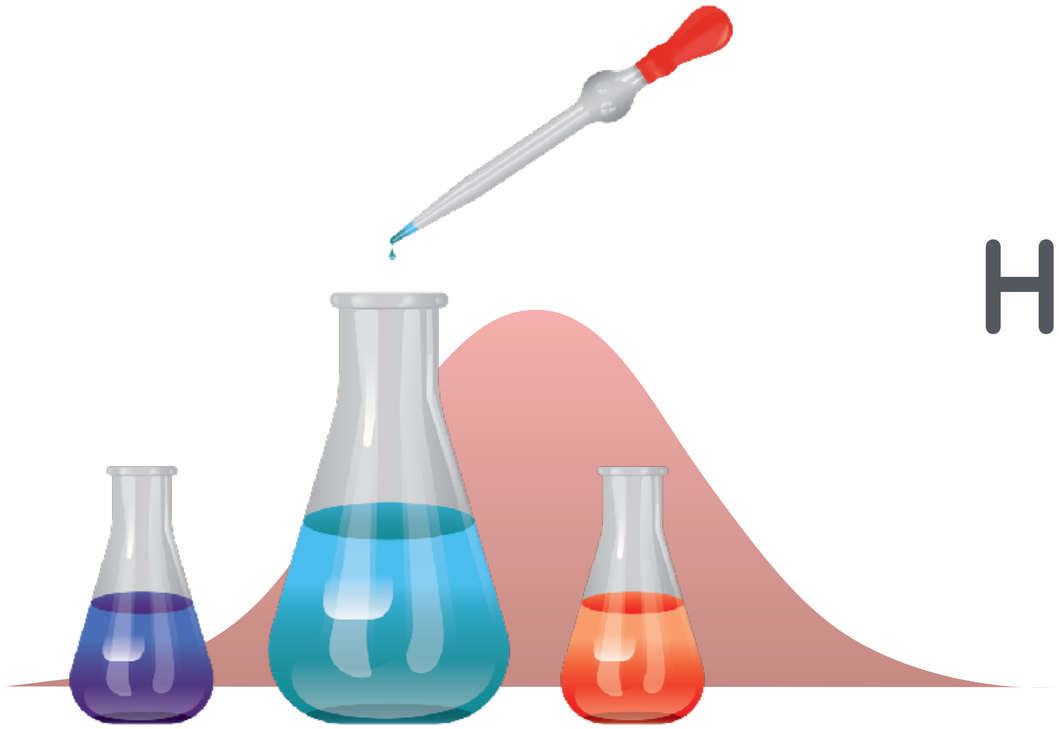

Hypothesis Testing

Hypothesis Tests Concerning Correlation

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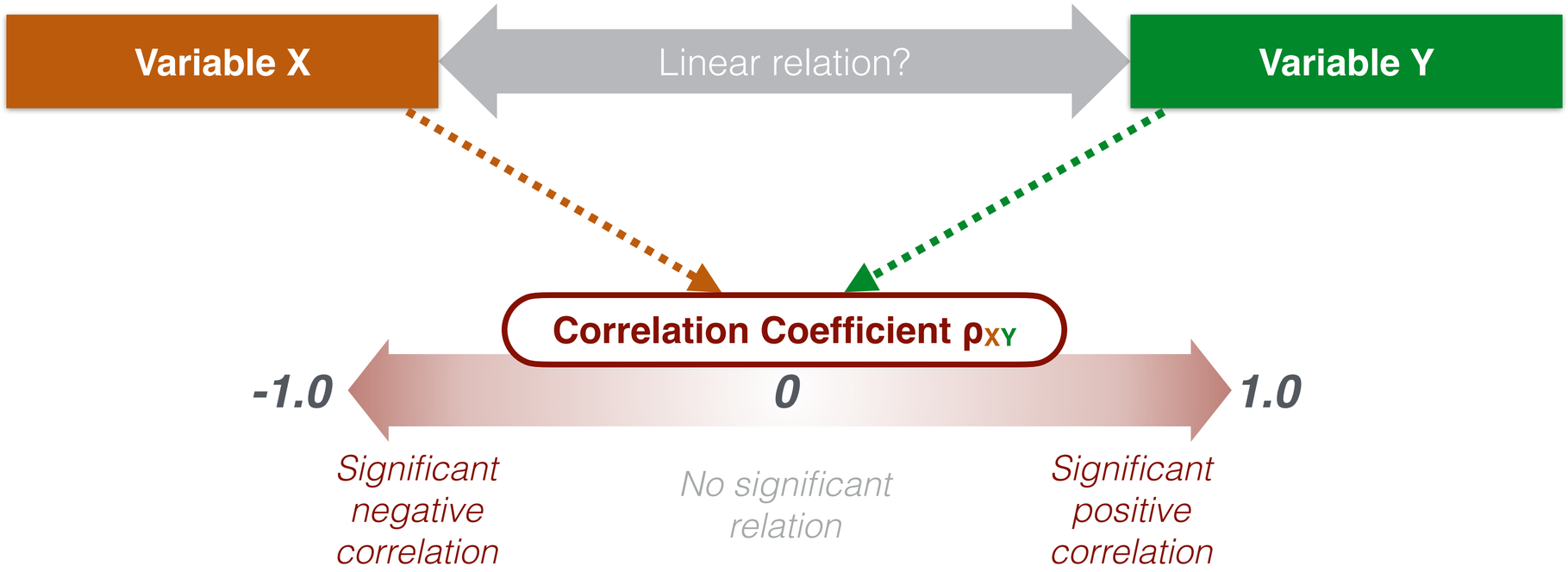
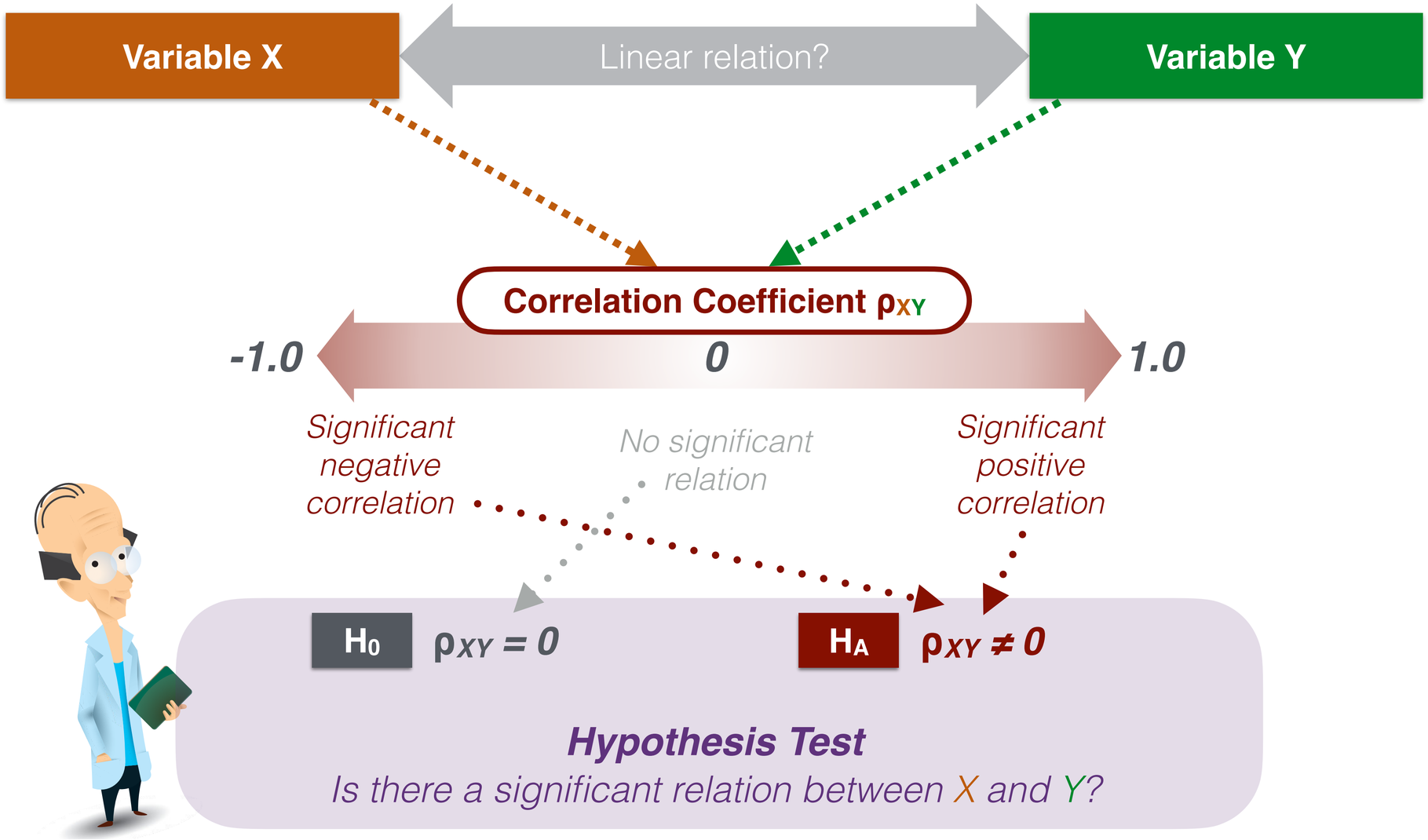
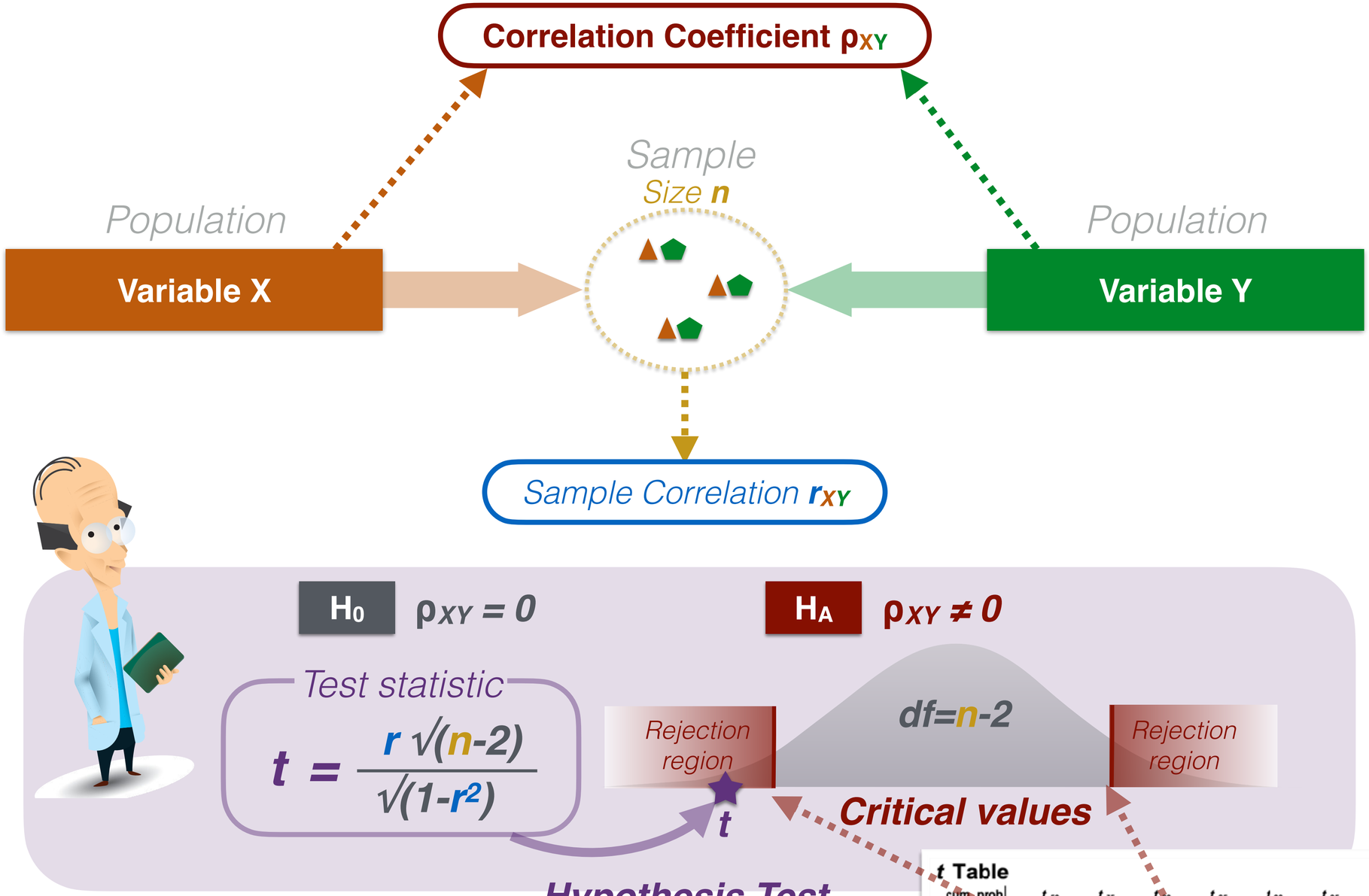

Variable X
Linear relation?
Variable Y
Correlation Coefficient ρXY
-1.0
0
1.0
Significant negative correlation
No significant relation
Significant positive correlation



PREP nuggets

Hypothesis Tests Concerning Correlation

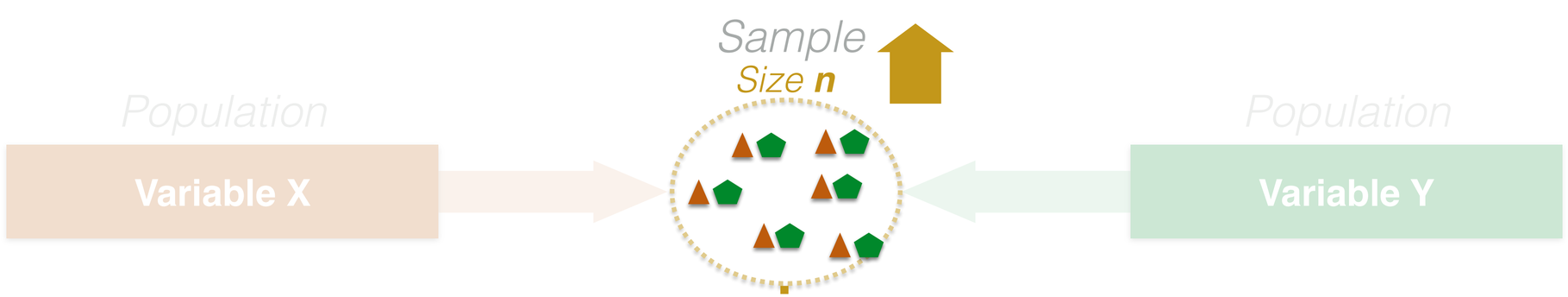


t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959

Hypothesis Tests Concerning Correlation

PREP nuggets



Sample Correlation r_{XY}

$|r|$ needed to reject H_0 decreases as $n\uparrow$

H_0 $\rho_{XY} = 0$

H_A $\rho_{XY} \neq 0$

Test statistic

$$t = \frac{r\sqrt{(n-2)}}{\sqrt{(1-r^2)}}$$

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cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
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7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965

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Hypothesis Tests Concerning Correlation

A commodities analyst wishes to prove that there is a linear relation between the monthly returns on gold price to the monthly US dollar index return. She collected the 24 monthly returns for the two variables for the past 2 years, and calculated the correlation is -0.451. Design and test a hypothesis that there is significant linear relation between the two variables at 5% level of significance.

1. State the hypothesis

$H_0: \rho = 0 \quad H_A: \rho \neq 0$

2. Select the test statistic

$$t = \frac{r\sqrt{(n-2)}}{\sqrt{(1-r^2)}}$$

$df = n-2 = 24-2 = 22$

3. Specify significance level

$\alpha = 5\%$

4. State decision rule

t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
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17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768

A commodities analyst wishes to prove that there is a linear relation between the monthly returns on gold price to the monthly US dollar index return. She collected the 24 monthly returns for the two variables for the past 2 years, and calculated the correlation is -0.451. Design and test a hypothesis that there is significant linear relation between the two variables at 5% level of significance.

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2. Select the test statistic

$$t = \frac{r\sqrt{(n-2)}}{\sqrt{(1-r^2)}}$$

$df = n-2 = 24-2 = 22$

3. Specify significance level

$\alpha = 5\%$

4. State decision rule

Reject H_0 if $t<-2.074$ or $t>2.074$

5. Calculate test statistic

$t = -0.451 \times \sqrt{(24-2)} / \sqrt{(1-(-0.451)^2)} = -2.37$

6. Statistical decision.

Reject H_0 since $t<-2.074$

Conclusion:

Significant correlation between monthly gold price returns and monthly US dollar index return


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