1.3) Hypothesis testing for zero correlation

Worked example	Your turn								
A scientist takes 19 observations of the masses of two reactants in an experiment. She calculates a product moment correlation coefficient of $r = 0.54$.	A scientist takes 14 observations of the masses of two reactants in an experiment. She calculates a product moment correlation coefficient of $r = -0.45$.								
The scientist believes there is a positive correlation between the masses of the two reactants. Test at the 1% level of significance, the scientist's claim, stating your hypotheses clearly.	The scientist believes there is a negative correlation between the masses of the two reactants. Test at the 5% level of significance, the scientist's claim, stating your hypotheses clearly. $H_0: \rho = 0$ $H_1: \rho < 0 \therefore$ One-tailed test. Sample size = 14 Significance level in tail = 5% Reject H_0 if $r < -0.4575$ r = -0.45 > -0.4575 The result is not significant. Insufficient evidence to reject H_0 . Insufficient evidence to suggest there is a negative correlation between the masses of the two reactants.								

Worked example	Your turn								
A scientist takes 20 observations of the masses of	A scientist takes 30 observations of the masses of								
two reactants in an experiment.	two reactants in an experiment.								
She calculates a product moment correlation	She calculates a product moment correlation								
coefficient of $r = 0.54$.	coefficient of $r = -0.45$.								
The scientist believes there is no correlation	The scientist believes there is no correlation								
between the masses of the two reactants.	between the masses of the two reactants.								
Test at the 1% level of significance, the scientist's	Test at the 10% level of significance, the scientist's								
claim, stating your hypotheses clearly.	claim, stating your hypotheses clearly.								
	$H_0: \rho = 0$ $H_1: \rho \neq 0$: Two-tailed test. Sample size = 30 Significance level in each tail = 5% Reject H_0 if $r < -0.3061$ r = -0.45 < -0.3061 The result is significant. Sufficient evidence to reject H_0 . Sufficient evidence to suggest there is a correlation between the masses of the two reactants.								

Worked example								Your turn												
The table from the large data set shows the daily mean temperature, $t {}^{\circ}C$, and the daily total rainfall, $r mm$, in Leuchars for a sample of nine days in October 1987.							The table from the large data set shows the daily maximum gust, x knots, and the daily maximum relative humidity, y %, in Leeming for a sample of eight days in May 2015.													
t	11.4	10.5	6.5	8.3	8.2	5.7	7.6	12.1	11.2	x 31 28 38 37 18 17 21 29										l
r	0	1	3.9	16.3	7.9	4.1	15.2	0	tr		у	99	94	87	80	80	89	84	86	
r013.916.37.94.115.20trTest, at the 10% level of significance, whether there is evidence of a negative correlation between daily mean temperature and daily total rainfall. State your hypotheses clearly.								Test, at is evided maximu humidit $H_0: \rho =$ $H_1: \rho >$ Sample Significa Reject H_1 r = 0.12 The resu Insuffici Insuffici correlat maximu	nce mg y. Sf 0 size ance I_0 if 149 ult is ient ient ient	of a gust a tate One = 8 e leve r > < 0 s not evid evid betv	posi and o your -taile el in o 0.506 : sign ence ence veen	tive daily hyp ed te each 067 7 nifica e to r e to s dail	corre max oothe est. i tail int. rejec sugg y ma	elation kimul eses = 10 t H_0 est t	on bo m re clear 0%	etwe lativ ly.	en c e posi	laily tive		