

Tutorial 9

Week of March 18, 2019

Question 9.1.3, Page 371

Pilates is a popular set of exercises for the treatment of individuals with lower back pain. An article reported on an experiment involving 86 subjects with non-specific low back pain. The participants were randomly divided into two groups of equal size. The first group received just educational materials, whereas the second group participated in 6 weeks of Pilates exercises. The sample mean level of pain (on a scale from 0 to 10) for the control group at a 6-week follow-up was 5.2 and the sample mean for the treatment group was 3.1; both sample standard deviations were 2.3.

- (a) Does it appear that true average pain level for the control condition exceeds that for the treatment condition? Carry out a test of hypotheses using a significance level of 0.01.
- (b) Does it appear that true average pain level for the control condition exceeds that for the treatment condition by more than 1? Carry out a test of appropriate hypotheses.

Question 9.1.14, Page 373

The level of monoamine oxidase (MAO) activity in blood platelets (nm/mg protein/h) was determined for each individual in a sample of 43 chronic schizophrenics, resulting in $\bar{x} = 2.69$ and $s_1 = 2.30$, as well as for 45 normal subjects, resulting in $\bar{y} = 6.35$ and $s_2 = 4.03$. Does this data strongly suggest that true average MAO activity for normal subjects is more than twice the activity level for schizophrenics? Derive a test procedure and carry out the test using $\alpha = 0.01$. [Hint: H_0 and H_A here have a different form from the three standard cases. Let μ_1 and μ_2 refer to true average MAO activity for schizophrenics and normal subjects, respectively, and consider the parameter $\theta = 2\mu_1 - \mu_2$. Write H_0 and H_A in terms of θ , estimate θ , and derive $\sigma_{\hat{\theta}}$].

Question 9.2.19, Page 379

Try this on your own!

Sugar Content of Cola

A study measured the sugar content of RC Cola and PC Cola. The data is summarized below:

Name	n	\bar{x}	s
RC Cola	23	13.69	1.6
PC Cola	20	12.64	1.7

- (a) Suppose that the two samples have a common population variance, σ^2 . Find the pooled estimator of σ^2 .

- (b) Assuming both samples come from a normal distribution with common population variance, carry out a pooled hypothesis test at the 1% level of significance to test whether RC Cola has a higher sugar content than PC Cola.
- (c) Construct a 99% lower bound for the difference in sugar content between RC Cola and PC Cola.