

I) Athletes performing in bright sunlight often smear black eye grease under their eyes to reduce glare. **Does eye grease really help raise the sensitivity to contrast?** In one study, 16 student subjects took a test of sensitivity to contrast after three hours facing into bright sun, both with and without eye grease. This is a matched pairs design. We record the differences in sensitivity, **with eye grease minus without eye grease**, and we find that the mean of the sample is 0.091.

a) What are the null and alternative hypotheses?

b) Suppose that the subjects are an SRS of all young people with normal vision, that contrast differences follow a Normal distribution in this population, and that the standard deviation of differences is  $\sigma = 0.22$ .

i) What is the value of the test statistic  $z$ ? (Round your answer to two decimal places.)

ii) What is the P-value of the test? (Round your answer to four decimal places.)

c) Is this data set significant at a 5% significance level.

II) A class survey in a large class for first-year college students asked, "About how many hours do you study during a typical week?" There were 464 responses to the class survey. Suppose that we know that the study time follows a Normal distribution with standard deviation  $\sigma = 8.4$  hours in the population of all first-year students at this university.

From the sample we get  $\bar{x} = 36.3$  hours for all 464 students. What is the 99% confidence interval for the population mean? (Round your answers to two decimal places.)