

Hypothesis testing examples

1. Aircrew escape systems are powered by a solid propellant. The burning rate of this propellant is an important product characteristic. Specifications require that the mean burning rate must be 50 cm per second. We know that standard deviation of burning rate is 2cm per second. From a random sample of size 25, the experimenter obtains the sample average burning rate is 51.3cm per second. What conclusion should be drawn?

2. Calculate the type II error if the true mean burning rate is 51 cm per second.

3. Suppose the analyst wishes to design the test so that if the true mean burning rate differs from 50cm per second by as much as 1 cm per second, the test will detect this with a high probability of 0.90, what sample size is required?

4. A researcher claims that at least 10% of all football helmets have manufacturing flaws that could potentially cause injury to the wearer. A sample of 200 helmets revealed that 16 helmets contained such defects.

a) Does this finding support the researcher's claim? Use $\alpha = 0.01$.

b) Find the p-value for this test.