
2. Moore and McCabe, 3rd edition, 6.64. Example 6.16 discusses a test about about the mean contents of cola bottles. The hypotheses are

\[ H_0 : \mu = 300 \]
\[ H_a : \mu < 300 \]

The sample size is \( n = 6 \) and the population is assumed to have a normal distribution with \( \sigma = 3 \). A 5% significance test rejects \( H_0 \) if \( z \leq -1.645 \) where the test statistic \( z \) is

\[ z = \frac{\bar{x} - 300}{3/\sqrt{6}} \]

Power calculations help us see how large a shortfall in the bottle contents the test can be expected to detect.

(a) Find the power of this test against the alternative \( \mu = 299 \).

(b) Find the power against the alternative \( \mu = 295 \).

(c) Is the power against \( \mu = 290 \) higher or lower than the value you found in (b)? Explain why this makes sense.


