

MATH 252-01: Probability and Statistics II

Problem Set 3

Assigned 2018 January 30
Due 2018 February 6

Show your work on all problems! If you use a computer to assist with numerical computations, turn in your source code as well.

1 Devore Chapter 7, Problem 44

2 Devore Chapter 8, Problem 12

Note that problem 8.12 is different in the eighth and ninth editions of Devore. Be sure to do the problem from the ninth edition.

3 Devore Chapter 8, Problem 18

Note that problem 8.18 is different in the eighth and ninth editions of Devore. Be sure to do the problem from the ninth edition.

4 Computational Exercise

Consider a sample of size $n = 10$ drawn from a normal distribution, and let the null hypothesis be $\mu = 0$. Let the null hypothesis H_0 be $\mu = 0$, and consider tests with false alarm (type I error) probability $\alpha = 0.05$. Suppose the population standard deviation σ is known to be 2.5. Plot the false dismissal (type II error) probability $\beta(\mu)$ as a function of the true population mean μ from $\mu = -3$ to $\mu = 3$, and obtain the numerical values of $\beta(-3)$, $\beta(-1)$, $\beta(0)$, $\beta(1)$, $\beta(2)$, and $\beta(3)$ for the following tests:

- An upper-tailed test appropriate to an alternative hypothesis $H_a: \mu > 0$.
- A lower-tailed test appropriate to an alternative hypothesis $H_a: \mu < 0$.
- A two-tailed test appropriate to an alternative hypothesis $H_a: \mu \neq 0$.

Note that in minitab this can be done with “Stat>Power and Sample Size”. Comment on the value of $\beta(\mu)$ in the cases where the sign of μ is inconsistent with the alternative hypothesis.