149. Let $X_1, ..., X_n$ be a random sample from a normal population with mean μ and known variance σ^2. Earlier, we derived the likelihood ratio test of

$$H_0 : \mu \leq \mu_0 \quad \text{versus} \quad H_1 : \mu > \mu_0.$$

and showed that the test rejects the null hypothesis for all samples such that

$$\bar{X} > \mu_0 + K.$$

(a) Derive the power function.

(b) For $\mu_0 = 0, \alpha = 0.05$, and samples of sizes $n = 1$, 4, 16, 64, and 100 from a normal population with mean μ and known variance use R to plot the power function. Include the graph with your homework.

(c) Find an expression for a valid p-value of the test.