MATH20802: STATISTICAL METHODS
SEMESTER 2
PROBLEM SHEET 9

Suppose $X_1, X_2, \ldots, X_n$ is a random sample from $N(\theta, \sigma^2)$, where σ^2 is assumed known. Determine the power function, $\Pi(\theta)$, for testing the following hypotheses:

1. $H_0 : \theta = \theta_0$ versus $H_1 : \theta < \theta_0$.
2. $H_0 : \theta = \theta_0$ versus $H_1 : \theta > \theta_0$.

In each case, assume a significance level of α.

Suppose $X_1, X_2, \ldots, X_n$ is a random sample from a Bernoulli distribution with parameter p. Assuming a significance level of α and that $\overline{X} = (X_1 + X_2 + \cdots + X_n)/n$ has an approximate normal distribution, find the power function, $\Pi(p)$, for each of the tests:

3. $H_0 : p = p_0$ versus $H_1 : p < p_0$.
4. $H_0 : p = p_0$ versus $H_1 : p > p_0$.