Chapter 10

- P-value is the minimal level of significance such that H_0 is rejected for the observed data.
- One sample $X_1, X_2, ..., X_n$, $EX_i = \mu$, $\mathrm{Var}(X_i) = \sigma^2$. Testing $H_0 : \mu = \mu_0$. Alternatives a) $H_1 : \mu > \mu_0$, b) $H_1 : \mu < \mu_0$, c) $H_1 : \mu \neq \mu_0$. The level of significance α.

1) X-s are normally distributed (or $n > 30$), σ^2 is known. The test statistic

$$Z = \sqrt{n}\frac{\bar{X} - \mu_0}{\sigma}.$$

Z has the standard normal distribution under H_0 (exactly or approximately). The critical region: a) $Z \geq z_\alpha$, b) $Z \leq -z_\alpha$, c) $|Z| \geq z_{\alpha/2}$.

2) X-s are normally distributed (or $n > 30$), σ^2 is unknown. The test statistic

$$T = \sqrt{n}\frac{\bar{X} - \mu_0}{S}.$$

T has the t-distribution with $n-1$ degrees of freedom under H_0 (exactly or approximately). The critical region: a) $T \geq t_{\alpha,n-1}$, b) $T \leq -t_{\alpha,n-1}$, c) $|T| \geq t_{\alpha/2,n-1}$.