① $H_0: p = p_0$ vs. $H_a: p \neq p_0$

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} \Longrightarrow \text{get p-value from } N(0,1)$$

---

② $H_0: \mu = \mu_0$ vs. $H_a: \mu \neq \mu_0$

$$t = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}} \Longrightarrow \text{get p-value from } t(n-1)$$

---

③ H_0: proportions are as given/claimed vs. H_a: proportions are NOT as claimed

$$\chi^2 = \sum \frac{(\text{observed} - \text{expected})^2}{\text{expected}} \Longrightarrow \text{p-value from } \chi^2(G-1)$$

G = # groups

---

④ H_0: variables are independent vs. H_a: variables are associated

$\Longrightarrow$ compute χ^2, get p-value from $\chi^2((r-1)\times(c-1))$

---

⑤ $H_0: \mu_1 = \mu_2 = \ldots = \mu_G$ vs. H_a: not all equal

$$F = \frac{MSG}{MSE} \Longrightarrow \text{get p-value from } F(df_G, df_E)$$