HYPOTHESIS TEST STATISTICS

① **One proportion** $H_0: p = p_0$, compute $z = \dfrac{\hat{p} - p_0}{\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}}$, get p-value

② **One mean** $H_0: \mu = \mu_0$, compute $t = \dfrac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}}$, get p-value

③ **χ^2-test** H_0: percentages for categories, compute $\chi^2 = \sum \dfrac{(\text{observed} - \text{expected})^2}{\text{expected}}$, get p-value

---

④ **ANOVA** $H_0: \mu_1 = \mu_2 = \mu_3 = \dots = \mu_G$, ($G$ = # groups) compute $F = \dfrac{\text{variation between groups}}{\text{variation within groups}}$

▷ In fact; with 3 groups,

$$F = \frac{\dfrac{n_1(\bar{x}_1 - \bar{x})^2 + n_2(\bar{x}_2 - \bar{x})^2 + n_3(\bar{x}_3 - \bar{x})^2}{2}}{\dfrac{(n_1-1)s_1^2 + (n_2-1)s_2^2 + (n_3-1)s_3^2}{(n_1+n_2+n_3-3)}}$$

variation between groups

variation within groups

← 21 here

$$= \frac{\dfrac{8(30.75 - 38)^2 + 8(34.01 - 38)^2 + 8(49.25 - 38)^2}{2}}{\dfrac{7(9.25)^2 + 7(14.63)^2 + 7(10.79)^2}{21}}$$

$$= \frac{\dfrac{1760.36}{2}}{\dfrac{2912.16}{21}} = 5.626 \Rightarrow p = .011$$