HYPOTHESIS TESTING (ch 8 sections 1 & 2)

A. DETERMINE H_O (null hypothesis) and H_A (alternative hypothesis)

one mean			one proportion			two means*	two proportions*
$H_O: \mu =$	$H_O: \mu =$	$H_O: \mu =$	$H_O: \pi =$	$H_O: \pi =$	$H_O: \pi =$	$H_O: \mu_1 = \mu_2$	$H_O: \pi_1 = \pi_2$
$H_A: \mu \neq$	$H_A: \mu <$	$H_A: \mu >$	$H_A: \pi \neq$	$H_A: \pi <$	$H_A: \pi >$	$H_A: \mu_1 \neq \mu_2$	$H_A: \pi_1 \neq \pi_2$
2 – tailed	left tailed	right tailed	2 – tailed	left tailed	right tailed	2 – tailed	2 - tailed

* left tailed = lower tailed, right tailed = upper tailed

*** also have left tailed and right tailed forms**

NOTE: two means, dependent (paired) samples use H_O: $\mu_D = \Delta$ where $\Delta = \mu_1 - \mu_2$

B. CHOOSE α LEVEL AND DETERMINE EFFECT OF TYPE I ERROR.

α is the level of significance

α (Probability of Type I error): Probability of rejecting H_O when H_O is actually true.
β (Probability of Type II error): Probablity of not rejecting H_O when H_O is false.

C. DETERMINE TEST STATISTIC (based on data and μ or π from H_O)

one mean: $t = \dfrac{\bar{x} - \mu_o}{s/\sqrt{n}}$

(p. 351, 357-8)

one proportion: $z = \dfrac{p - p_O}{\sqrt{\dfrac{p(1-p)}{n}}}$

(not in book) p_O = value from H_O

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two means: $\left\{ \begin{array}{c} df = \text{see below, round down} \\ \Delta \text{ is } \mu_1 - \mu_2 \end{array} \right\}$ $t = \dfrac{(\bar{x}_1 - \bar{x}_2) - \Delta}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}}$

p. 361 – 2

$$df = \frac{\left[(se_1)^2 + (se_2)^2 \right]^2}{\dfrac{(se_1)^4}{n_1 - 1} + \dfrac{(se_2)^4}{n_2 - 1}} \quad \text{where} \quad se = \frac{s}{\sqrt{n}}$$

round down for df

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paired data: $t = \dfrac{\bar{d} - \Delta}{s_d/\sqrt{n}}$ **where** $\left\{ \begin{array}{l} n = \text{no. pairs} \\ \bar{d} = \text{mean pair difference} \\ \Delta = \text{population mean difference} \\ s_d = \text{st. dev of pair differences} \end{array} \right.$ **df = n - 1**

p. 365

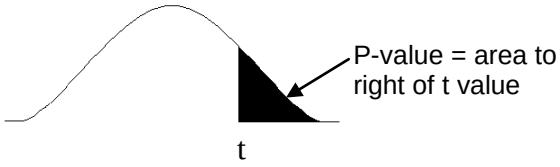
two proportions

$$z = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\hat{p}\hat{q}}\sqrt{\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \qquad \hat{p} = \frac{x_1 + x_2}{n_1 + n_2}$$ **not in text**

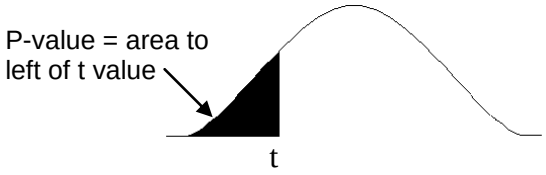
D. Determine the P-value (see page 353, 356)
based on upper-tailed, lower-tailed, or two tailed test, t-value (test statistic) and degrees of freedom (df)

Use table VI on page 658-670 to find P-value

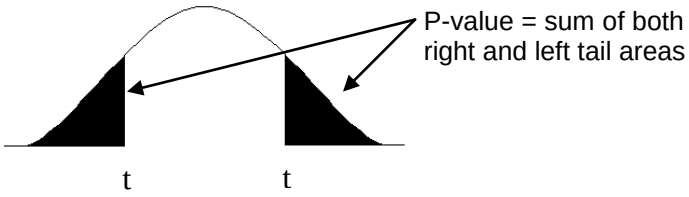
Upper-tailed
(when H_a contains >)



Lower-tailed
(when H_a contains <)



Two-tailed
(when H_a contains ≠)



E. Make a decision:

If P ≤ α level, reject H_O
If P > α level, do not reject H_O

F. SUMMARIZE DECISION – Include the α level, reject or accept H_O, and a brief description of H_O.