Section 11.4 Putting It Together: Which Method Do I Use?

Hypothesis Tests Regarding Two Populations

So we now have four new hypothesis tests to add to our arsenal. Here they are again:

Tests Regarding the Difference Between Two Population Means

In order to perform a hypothesis test regarding two population means, the following must be true concerning a sample:

1. the sample is obtained using simple random sampling, and
2. the sample data are matched pairs, and
3. the sample has no outliers and the population from which the sample is drawn is normally distributed, or the sample size is large (n≥30).

Then the test statistic is $t_0 = \dfrac{\bar{d} - \mu_d}{s_d/\sqrt{n}}$

Tests Regarding the Mean Difference

In order to perform a hypothesis test regarding the mean difference, the following must be true:

1. a simple random sample of size n_1 is taken from a population with unknown mean μ_1 and unknown standard deviation σ_1
2. a simple random sample of size n_2 is taken from a second population with unknown mean μ_2 and unknown standard deviation σ_2
3. the two populations are normally distributed or the sample sizes are sufficiently large (n_1, $n_2 \geq 30$)

Then the test statistic is: $t_0 = \dfrac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}}$

Tests Regarding the Difference Between Two Population Proportions

In order to perform a hypothesis test regarding the mean difference, the following must be true:

1. simple random samples size n_1 and n_2 are taken from two populations
2. $n_1\hat{p}_1(1-\hat{p}_1) \geq 10$
3. $n_2\hat{p}_2(1-\hat{p}_2) \geq 10$
4. both sample sizes are less than 5% of their respective populations.

Then the test statistic is: $z_0 = \dfrac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\dfrac{p_1(1-p_1)}{n_1} + \dfrac{p_2(1-p_2)}{n_2}}}$

Tests Regarding Two Population Standard Deviations

In order to perform a hypothesis test regarding the mean difference, the following must be true:

1. $\sigma_1^2 = \sigma_2^2$
2. s_1^2 and s_2^2 are sample variances from independent simple random samples of size $n_1$and n_2, respectively
3. both populations are normal

Then the test statistic is: $F = \dfrac{s_1^2}{s_2^2}$

Choosing the Appropriate Hypothesis Test

Now that we've done a (very) quick review of the four various tests, it's helpful to think of a flowchart when deciding which test to apply. Here's a version of the flowchart from your text: