z-Test, t-Test or ANOVA?

- Number Of Samples
  - **One** (testing claim about population)
    - Population Proportion
      - If np > 5 and nq > 5, use $z = \dfrac{\hat{p} - p}{\sqrt{\hat{p}\hat{q}/n}}$
    - Population Parameter (E.g. Height, IQ)
      - Population standard deviation <u>known</u>: use $z = \dfrac{\overline{X} - \mu}{\sigma / \sqrt{n}}$
      - Population standard deviation <u>un</u>known: use $z = \dfrac{\overline{X} - \mu}{s / \sqrt{n}}$ if n > 30
        use $t = \dfrac{\overline{X} - \mu}{s / \sqrt{n}}$, df = n -1 if $n \le 30$
  - **Two** (Comparing two populations)
    - Population Proportions
      - Use $z = \dfrac{\hat{p}_1 - \hat{p}_2}{\sqrt{p'q'(1/n_1 + 1/n_2)}}$, $p' = \dfrac{n_1\hat{p}_1 + n_2\hat{p}_2}{n_1 + n_2}$, $q' = 1 - p'$
    - Population Parameters (E.g. Height, IQ)
      - Independent samples
        - Large samples (n_1, n_2 > 30): use $z = \dfrac{\overline{X}_1 - \overline{X}_2}{\sqrt{s_1^2/n_1 + s_2^2/n_2}}$
        - Small samples: use $t = \dfrac{\overline{X}_1 - \overline{X}_2}{s_p\sqrt{1/n_1 + 1/n_2}}$, $\text{df} = n_1 + n_2 - 2$

          $$s_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2}$$
      - Dependent (paired) samples (E.g. Before and after study)
        - Use $t = \dfrac{\overline{X}_d - \mu_d}{s_d / \sqrt{n}}$, df = n – 1. *d* is for “difference” (i.e. after result – before result)
  - **Many**
    - ANOVA