Select an Appropriate One Sample Test!!!!

- Is the value of $\sigma$ known?
  - Yes
    - Is the population normal?
      - Yes
        - Is n large enough $(n \geq 30)$?
          - Yes
            - Use $z$ test:
              \[ z^* = \frac{\bar{x} - \mu_0}{\sigma / \sqrt{n}} \]
          - No
            - Cannot use $z$ test!
              What to do? Answer: Increase the sample size to at least 30 to conduct the test or use a non-parametric technique.
      - No
        - Cannot use $z$ test!
          What to do? Answer: Increase the sample size to at least 30 to conduct the test or use a non-parametric technique.
  - No
    - Is the population normal?
      - Yes
        - Is the population single-peaked and not very skewed?
          - Yes
            - Is n large enough $(n \geq 30)$?
              - Yes
                - Use $t$ test:
                  \[ t^* = \frac{\bar{x} - \mu_0}{s / \sqrt{n}} \]
              - No
                - Cannot use $t$ test!
                  What to do? Answer: Increase the sample size to at least 30 to conduct the test or use a non-parametric technique.
          - No
            - Cannot use $t$ test!
              What to do? Answer: Increase the sample size to at least 30 to conduct the test or use a non-parametric technique.
    - No
      - Cannot use $t$ test!
        What to do? Answer: Increase the sample size to at least 30 to conduct the test or use a non-parametric technique.
Select an Appropriate Two Sample Test!!!!

- Are the values of $\sigma_1$ and $\sigma_2$ known?
  - Yes
    - Are the populations normal?
      - Yes
        - Are $n_1$ and $n_2$ large enough ($\geq 30$)?
          - Yes
            - Use $z$ test:
              \[
              z^* = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} 
              \]
              $(\mu_1 - \mu_2)$ given by $H_0$
          - No
            - Cannot use $z$ test!
              What to do? Answer: Increase the sample sizes to at least 30 to conduct the test or use a non parametric technique.
      - No
        - Are $n_1$ and $n_2$ large enough ($\geq 30$)?
          - Yes
            - Use $t$ test:
              \[
              t^* = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} 
              \]
              $(\mu_1 - \mu_2)$ given by $H_0$
          - No
            - Cannot use $t$ test!
              What to do? Answer: Increase the sample size to at least 30 to conduct the test or use a non parametric technique.
  - No
    - Are the populations normal?
      - Yes
        - Are $n_1$ and $n_2$ large enough ($\geq 30$)?
          - Yes
            - Use $z$ test:
              \[
              z^* = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} 
              \]
              $(\mu_1 - \mu_2)$ given by $H_0$
          - No
            - Cannot use $z$ test!
              What to do? Answer: Increase the sample sizes to at least 30 to conduct the test or use a non parametric technique.
      - No
        - Are the populations single-peaked and not very skewed?
          - Yes
            - Use $t$ test:
              \[
              t^* = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} 
              \]
              $(\mu_1 - \mu_2)$ given by $H_0$
          - No
            - Cannot use $t$ test!
              What to do? Answer: Increase the sample size to at least 30 to conduct the test or use a non parametric technique.