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1. $H_0: \mu \geq 198$, $H_1: \mu < 198$

$\alpha = 0.05$

棄却域 $C = \{T < -t_{0.05}(9)\} = \{T < -1.833\}$

$T = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}} = \frac{190 - 198}{\frac{13.16}{\sqrt{10}}} = -1.922$

$T \in C$，所以棄却 H_0。

2. $H_0: \mu = 420$　$H_1: \mu \neq 420$

$\alpha = 0.05$　棄却域 $C = \{|Z| > Z_{0.025}\} = \{|Z| > 1.96\}$

$Z = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}} = \frac{423 - 420}{\frac{12}{\sqrt{100}}} = 2.5$

$Z \in C$，棄却 H_0。

3. $H_0: \mu \geq 70$, $H_1: \mu < 70$

$\alpha = 0.05$　棄却域 $C = \{Z < -Z_{0.05}\} = \{Z < -1.88\}$

$Z = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}} = \frac{68.5 - 70}{\frac{6}{\sqrt{36}}} = -1.5$

$Z \notin C$　接受 H_0。

4. P-值 $= P(Z < -1.5)$

$= 0.0668 > 0.05$

接受 H_0。

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5. $H_0: \mu \le 1.5$ $H_1: \mu > 1.5$

$\alpha = 0.05$ 拒绝域 $C = \{T > t_{0.05}(4)\} = \{T > 2.132\}$

$T = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}} = \frac{1.52 - 1.5}{\frac{0.014}{\sqrt{5}}} = 2.354$

$T \in C$ 所以拒绝 H_0。

6. (1) $H_0: \mu = 4.3$ $H_1: \mu \neq 4.3$

$\alpha = 0.05$ 拒绝域 $C = \{|Z| > Z_{0.025}\} = \{|Z| > 1.96\}$

$Z = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}} = \frac{4.65 - 4.3}{\frac{1.26}{\sqrt{100}}} = 1.757$

(2) $H_0: \mu = 4.3$ $H_1: \mu \neq 4.3$

$\alpha = 0.05$ 拒绝域 $C = \{|Z| > Z_{0.025}\} = \{|Z| > 1.96\}$

$Z = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}} = \frac{4.65 - 4.3}{\frac{1.26}{\sqrt{80}}} = 2.485$

7. $H_0: \mu_1 = \mu_2$ $H_1: \mu_1 \neq \mu_2$

$\alpha = 0.05$ 拒绝域 $C = \{|Z| > Z_{0.025}\} = \{|Z| > 1.96\}$

$Z = \frac{(\bar{x} - \bar{y}) - 0}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} = \frac{38.3 - 40.1}{\sqrt{\frac{40}{100} + \frac{35}{80}}} = -2.045$

$Z \in C$ 所以拒绝 H_0。

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8. $H_0: \mu_1 = \mu_2$ $H_1: \mu_1 \neq \mu_2$

$\alpha = 0.05$ 拒绝域 $C = \{|Z| > Z_{0.025}\} = \{|Z| > 1.96\}$

$$Z = \frac{(\bar{x} - \bar{y}) - 0}{S_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} = \frac{37 - 34}{3.430\sqrt{\frac{1}{64} + \frac{1}{81}}} = 3.486$$

其中 $S_p = \sqrt{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1 + n_2 - 2}} = \sqrt{\frac{63(3.2)^2 + 80(3.6)^2}{143}} = 3.430$

$Z \in C$ 所以拒绝 H_0

9. $H_0: \mu_1 = \mu_2$ $H_1: \mu_1 \neq \mu_2$

$\alpha = 0.05$ 拒绝域 $C = \{|T| > t_{0.025}(18)\} = \{|T| > 2.101\}$

$$T = \frac{(\bar{x} - \bar{y}) - 0}{S_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} = \frac{82.6 - 84.9}{5.693\sqrt{\frac{1}{10} + \frac{1}{10}}} = -0.903$$

$$S_p = \sqrt{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1 + n_2 - 2}} = \sqrt{\frac{9(4.5)^2 + 9(6.6)^2}{18}} = 5.693$$

$T \notin C$，接受 H_0

10. $H_0: p \leq 0.4$ $H_1: p > 0.4$

$\alpha = 0.05$ 拒绝域 $C = \{Z > Z_{0.05}\} = \{Z > 1.645\}$

$$Z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = \frac{0.45 - 0.4}{\sqrt{\frac{0.4(0.6)}{100}}} = 1.021$$

$Z \notin C$，接受 H_0