Assignment 10 of CISC 1006

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\begin{aligned}
\mu =& 800 \\
\sigma =& 40 \\
H_0 : \mu =& 800 \\
H_1 : \mu \neq& 800 \\
n =& 30 \\
\overline{X} =& 788
\end{aligned}
$$

Let $Z =$

$$\frac{\overline{X} - \mu}{\frac{\sigma}{\sqrt{n}}} = -\frac{3\sqrt{30}}{10} \approx -1.64$$

Thus,

$$
\begin{aligned}
p =& P(Z \leq -1.64) + P(Z \geq 1.64) \\
\approx& 0.050502583 + 0.050502583 \\
=& 0.1010 \geq 0.05 = \alpha
\end{aligned}
$$

Thus, wo can not have sufficient envidence to reject H_0. Therefore, we can conclude the average light time ofeach electrical bulbs is 800 hours against with bigger of lower than 800 hours under the signficant level $\alpha = 0.05$

2

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\begin{aligned}
H_0 : \mu \geq& 40 \\
H_1 : \mu <& 40 \\
x \sim& Normal
\end{aligned}
$$

where σ is unknown, $n = 64 > 30$. Thus

$$T = \frac{\overline{X} - \mu}{\frac{s}{\sqrt{n}}} \sim t_\alpha(n-1) \approx Normal(0,1)$$

$$P(T) = P(\frac{38 - 40}{\frac{5.8}{8}}) = P(-\frac{16}{5.8}) \approx 0.0029 \leq \aleph = 0.05$$

That means that we have enough evidence to reject H_0. We can conclude the mean life $\mu < 40$ is valid under the signficant level $\alpha = 0.05$

3

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\begin{aligned}
H_0: \mu \leq & 8 \\
H_1: \mu > & 8 \\
T = & \frac{\overline{X} - \mu}{\frac{s}{\sqrt{n}}} \\
\sim & t_\alpha(n-1) \approx Normal(0,1) \\
P(T|_\mu) \leq & P(T|_{\mu=8}) \\
= & 1 - P(\frac{8.5-8}{\frac{2.25}{\sqrt{225}}}) \\
\approx & 0.000434 < \alpha = 0.05
\end{aligned}
$$

That means we should reject our null hypothesis. And we conclude that the average value of a man who use TM is more than 8 hourse per week under signficant level $\alpha = 0.05$.

4

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\begin{aligned}
H_0: \mu \leq & 220 \\
H_1: \mu > & 220 \\
X \sim Normal \rightarrow & \overline{X} \sim Normal \\
T = & \frac{\overline{X} - \mu}{\frac{s}{\sqrt{n}}} \sim t_\alpha(n-1) \\
P(T|_\mu) \leq & P(T|_{\mu=220}) \\
= & 1 - P(\frac{244-220}{\frac{24.5}{\sqrt{20}}} \\
\approx & 0.00000593 < 0.05
\end{aligned}
$$

Thus we can reject H_0. aWe could conclude that the average is greater than 220 in a signficant level $\alpha = 0.05$

5

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\begin{aligned}
H_0: \mu_1 - \mu_2 < & 12 \\
H_1: \mu_1 - \mu_2 \geq & 12 \\
\overline{X}_A \sim & Normal(\mu_A, \frac{\sigma_A^2}{n_A}) \\
\overline{X}_B \sim & Normal(\mu_B, \frac{\sigma_B^2}{n_B}) \\
\overline{X}_A - \overline{X}_B \sim & Normal(\mu_A - \mu_B, \frac{\sigma_A^2}{n_A} + \frac{\sigma_B^2}{n_B}) \\
Z = & \frac{\overline{X}_A - \overline{X}_B - (\mu_A - \mu_B)}{\frac{\sigma_A^2}{n_A} + \frac{\sigma_B^2}{n_B}} \\
\sim & Normal(0,1) \\
P(Z|_{\mu_A - \mu_B = 12}) = & 1 - P(-2.603) \\
= & 0.995
\end{aligned}
$$

Thus, we can not reject H_0 under signficant level $\alpha = 0.05$. We fail to test the claims that the average of A is greater that the average of B by 12 under $\alpha = 0.05$