HW7 葉詩富.
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1. (1) $P(Z>k)=0.2$

$\Rightarrow 1-P(Z\le k)=0.8$

$k\approx 0.845$ #

(2) $P(Z>k)=0.1$

$\Rightarrow 1-P(Z\le k)=0.9$

$k\approx 1.285$ #

(3) $P(Z>k)=0.05$

$\Rightarrow 1-P(Z\le k)=0.95$

$k\approx 1.645$ #

(4) $P(Z\le K)=0.2$

$k\approx -0.845$ #

(5) $P(Z\le k)=0.1$

$k\approx -1.285$ #

(6) $P(Z\le K)=0.05$

$k\approx -1.645$ #

2. $\mu = 86\,mm$, $\sigma = 8\,mm$, $n = 14$, $\bar{x} = 91.1\,mm$

(a) $\frac{\sigma}{\sqrt{n}} = \frac{8}{\sqrt{14}} = 2.14$ *

(b)(c) $\left[\bar{x} \pm Z_{\frac{\alpha}{2}} \cdot \frac{\sigma}{\sqrt{n}}\right]$ 95% confidence interval.

$1-\alpha = 95\% \Rightarrow \alpha = 5\%$

$\because Z_{\frac{\alpha}{2}} = Z_{0.025} = 1.96$ *

$\therefore \left[\bar{x} - Z_{\frac{\alpha}{2}} \cdot \frac{\sigma}{\sqrt{n}},\ \bar{x} + Z_{\frac{\alpha}{2}} \cdot \frac{\sigma}{\sqrt{n}}\right] = [91.1 - 1.96 \times 2.14,\ 91.1 + 1.96 \times 2.14]$

$= [86.9056,\ 95.2944]$ *

3.

(a) $1-\alpha = 90\% \Rightarrow \alpha = 10\%$

$\because Z_{\frac{\alpha}{2}} = Z_{0.05} = 1.645$

$\therefore \left[\bar{x} - Z_{\frac{\alpha}{2}} \cdot \frac{\sigma}{\sqrt{n}},\ \bar{x} + Z_{\frac{\alpha}{2}} \cdot \frac{\sigma}{\sqrt{n}}\right] = [91.1 - 1.645 \times 2.14,\ 91.1 + 1.645 \times 2.14]$

$= [87.5797,\ 94.6203]$ *

(b) B 課程錯誤：區間寬度變長代表估計的不確定性增加

所以 90% 信心有較小的 margin of error.

*

4.

critical value $= Z_{0.025} = 1.96$

$Z_{0.025} \times \frac{\sigma}{\sqrt{n}} = 900 \Rightarrow 1.96 \times \frac{10500}{\sqrt{n}} = 900 \Rightarrow \sqrt{n} = \frac{1.96 \times 10500}{900} \Rightarrow n = \left(\frac{1.96 \times 10500}{900}\right)^2$

$\Rightarrow n = 522.88 \approx 523$ #

5.

(a)

$1-\alpha = 95\% \Rightarrow \alpha = 5\%$.

$t_{\frac{\alpha}{2}, n-1} = t_{0.025, 11} = 2.201$ #

(b)

$1-\alpha = 99\% \Rightarrow \alpha = 1\%$

$t_{\frac{\alpha}{2}, n-1} = t_{0.005, 23} = 2.807$ #

(c)

$1-\alpha = 90\% \Rightarrow \alpha = 10\%$

$t_{\frac{\alpha}{2}, n-1} = t_{0.05, 199} = t_{0.05, \infty} = 1.645$ #.

↑ by 查表

6.

(a) It is normally distribution, because by central limit theorem.

(b) freedom = 282 - 1 = 281.

$1-\alpha = 99\% \Rightarrow \alpha = 1\%$

critical value $t_{\frac{\alpha}{2},n-1} = t_{0.005,281} \overset{\text{by 查表}}{=} t_{0.005,\infty} = 2.576$.

$\therefore \left[\bar{x} - t_{\frac{\alpha}{2},n-1} \times \frac{s}{\sqrt{n}} , \bar{x} + t_{\frac{\alpha}{2},n-1} \times \frac{s}{\sqrt{n}}\right]$

$= \left[2.22 - 2.576 \times \frac{1.03}{\sqrt{282}} , 2.22 + 2.576 \times \frac{1.03}{\sqrt{282}}\right]$

$= [2.062, 2.378]$ #

the interval and the 99% confidence level

meaning repeated sampling, the probability that the random interval will cover the true value of μ is 99% #