Hw 8.3 Part B pages 518-521 problems 55, 56, 63, 67, 71, 73, 75-78

(55) $\sigma = 7.5$ $n = ?$ $ME = 1$ 99% confidence

since we know σ, $ME \geq z^* \left(\frac{\sigma}{\sqrt{n}}\right)$ $z^*_{99\%} = \text{invNorm}(.005) = 2.576$

$1 \geq 2.576 \left(\frac{7.5}{\sqrt{n}}\right)$ or $1 \geq 2.576 \left(\frac{7.5}{\sqrt{n}}\right)$

$\frac{1}{2.576} \geq \frac{7.5}{\sqrt{n}}$ $1 \geq \frac{19.32}{\sqrt{n}}$

$\sqrt{n} \geq \frac{7.5}{1/2.576}$ $\sqrt{n} \geq \frac{19.32}{1}$

$n \geq \left(\frac{7.5}{1/2.576}\right)^2$ $n \geq \left(\frac{19.32}{1}\right)^2$

$n \geq 373.2624$

$n \geq 373.2624$

so minimum sample size is 374

(56) $\sigma = 50$ $n = ?$ $ME = 2$ 95%

$ME \geq z^* \left(\frac{\sigma}{\sqrt{n}}\right)$ $z^*_{95\%} = 1.96$

$2 \geq \frac{1.96}{1} \left(\frac{50}{\sqrt{n}}\right)$

$2 \geq \frac{98}{\sqrt{n}}$

$\sqrt{n} \geq \frac{98}{2}$

$n \geq \left(\frac{98}{2}\right)^2$

$n \geq 2401$

min sample size 2401

63 ~~need~~ 4 step process

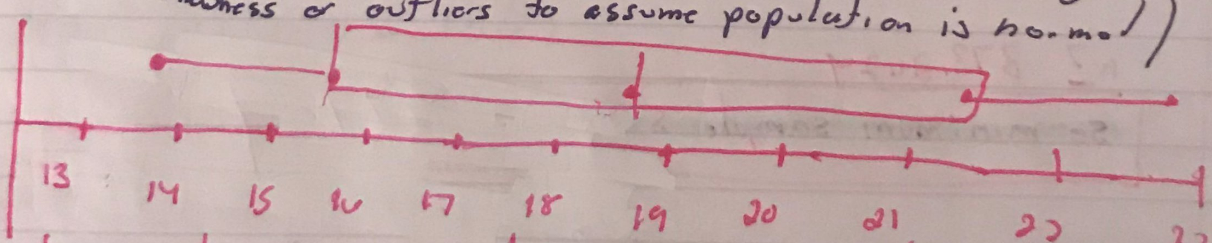
State: We want to estimate μ the true mean fuel efficiency for this vehicle at a 95% confidence level

Plan: One Sample t-interval for μ

1. Random: random sample of 20 mpg values ✓
2. 10% (Independent)
   10 (20) ≤ all possible mpg values for this vehicle
   200
   reasonable to assume ✓

* Remember *

3. Normal: (since $n = 20$ can't use CLT and we don't know if population is Normal we must graph to look for no strong skewness or outliers to assume population is normal)



no strong skewness or outliers, ∴ population ~ N ✓

Do: P.E ± ME

$\bar{x} \pm t^* \left(\frac{s_x}{\sqrt{n}}\right)$

$\bar{x} = 18.48$ $s_x \approx 3.116$ $n = 20$

$t^*_{95\%}$ $df = 19$ $t^* = 2.093$

$18.48 \pm 2.093 \left(\frac{3.116}{\sqrt{20}}\right)$

$18.48 \pm 1.458 \longrightarrow (17.022, 19.938)$

Conclude: We are 95% confident that the interval from 17.022 to 19.938 captures the true mean μ mpg for this vehicle.

(67) ~~a)~~ Need 4 step process:

State: We want to estimate μ the true mean percent of change in BMC in population of breast feeding mothers at a 99% confidence level

Plan: One Sample t-interval for μ

① Random: 47 randomly selected mothers ✓

② 10% (Independent): $10(47) \le$ pop of b.f. mothers
470
reasonable to assume ✓

③ Normal: Yes, by CLT since $47 \geq 30$ ✓

Do: P.E $\pm$ ME

$\bar{x} \pm t^*\left(\frac{s_x}{\sqrt{n}}\right)$

$\bar{x} = -3.587$ % $n = 47$

$s_{\bar{x}} = 2.506$ %

$t^*_{99\%} \Rightarrow df = 46$

$\text{invT}\left(\frac{.01}{2}, 46\right) = 2.687$

$t^* = 2.687$ if you use calc

$t^* = 2.704$ if you use table

$-3.587 \pm 2.687\left(\frac{2.506}{\sqrt{47}}\right)$

$-3.587 \pm .982$

$(-4.569, -2.605)$ ← calc answer

$-3.587 \pm 2.704\left(\frac{2.506}{\sqrt{47}}\right)$

$-3.587 \pm .988$

$(-4.575, -2.599)$

Table answer

Conclude: We are 99% confident that the interval from -4.569 to -2605 captures the true mean μ % change in BMC.

b) Yes: The interval includes only negative #'s which represent bone mineral loss, so we are quite confident that nursing mothers lose bone mineral.

(71) We have a small sample size (less than 30) and the graph shows several outliers.

(73) a) No. The goal is to estimate a population proportion, not a population mean.

b) No. The sample was not selected randomly from all male students at this college.

c) No; The sample size is small (25 is less than 30) and there are several outliers.

(75) B

(76) $n=23$ $df=22$ $t^*_{98\%} = invT(.01, 22) = 2.508$

$\boxed{A}$

(77) B (smaller ME at lower confidence + larger sample size)

(78) A