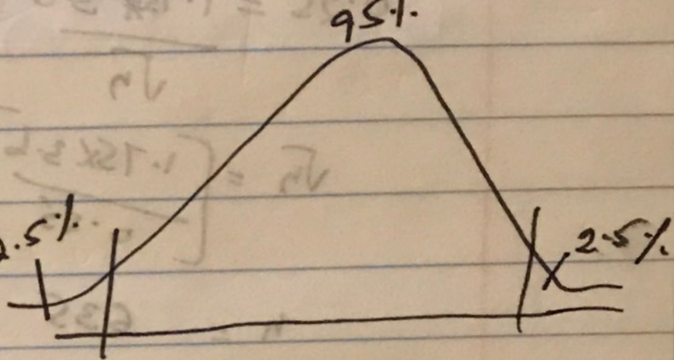
Confidence Interval Assignment:-

1) Sample = 1000

$\mu_{pop} = \mu_{sample} = 180$ lbs

$\sigma_{sample} = 30$ lbs

95% C.I



$Z = 1.96$

$ZSE = 1.96 * 30$

$= 58.8$

97.5

Area under the curve = 0.975

$C.I = \mu \pm ZSE$

$= 180 \pm 58.8$

$CI = (121.2, 238.8)$

2. $\sigma = 3.6$ min $\Rightarrow \sigma_{sample} = \sigma/\sqrt{n} = \frac{3.6}{\sqrt{120}} = 0.33$

$n = 120$

$\mu_{pop} = \mu_{sample} = 16.2$ minutes

92% C.I

area under the curve $92+4 = 96\%$

0.96

$Z = 1.75$

$\mu \pm ZSE = 16.2 \pm (1.75 * 0.33) = 16.2 \pm 0.5775$

= (~~16.775~~,

(15.6225, 16.775)

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$Z = 1.75$ for 92% confidence Interval

$SE = 0.25$ min $\simeq$ 15 Seconds

$SE = Z * \sigma / \sqrt{n}$

$$0.25 = \frac{1.75 * 3.6}{\sqrt{n}}$$

$$\sqrt{n} = \left[\frac{1.75 \times 3.6}{0.25}\right]^2$$

$n = 635$

3) Margin of error $= Z\,SE$

$$= Z * \sqrt{\frac{P_0(1-P_0)}{n}}$$

$CI = 90\% \Rightarrow Z = 1.65$

$$0.02 = 1.65 * \sqrt{\frac{P_0(1-P_0)}{n}}$$

b) $n = 1000$

$$\hat{p} = \frac{400}{1000} = 0.4$$

$$\hat{p} \pm Z * \sqrt{\frac{P_0(1-P_0)}{n}}$$

$$0.4 \pm 1.645 * \sqrt{\frac{0.4 \times 0.6}{1000}}$$

$= \cancel{0.43},$

$= (0.37,\ 0.43)$

4) $CI = \mu \pm Z\,SE$

$n = 4$

Mean of all weights $= 0.95, 102, 1.01, 0.98$

$= 0.99$

$$SE \text{ (or) } SD = \sum_0^i \sqrt{\frac{(x_i-\mu)^2}{n}} = \sqrt{\frac{(0.95-0.99)^2+(0.98-0.99)^2+(1.01-0.99)^2+(1.02-0.99)^2}{n=4}}$$

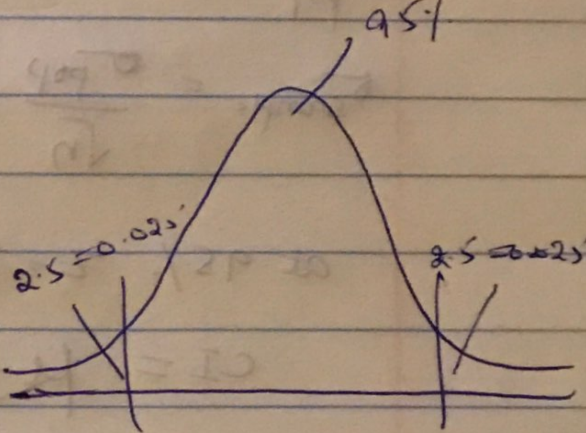
$$= \sqrt{\frac{0.0016+0.0001+0.0004+0.0009}{4}} = 0.027$$

5) $\mu_{pop} = 45$ sec

$n = 9$

$\mu_{sample} = 49.2$ sec

$\sigma_{sample} = 3.5$ sec



$H_0 \Rightarrow \mu = 45$ sec

$H_a \Rightarrow \mu \neq 45$ sec

given C.I = 95% $\alpha = 0.05$

two tailed test

$$Z_{critical} = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$$

$$= \frac{49.2 - 45}{\frac{3.5}{\sqrt{9}}} = \frac{4.2}{1.167} = 3.59$$

$Z_{sample} = 1.96$

$Z_{critical} > Z_{sample}$

Sample falls under the critical region

Hence H_0 is rejected

$\therefore$ Mean time after vigorous exercise is changed at 95% confidence level

6) $\mu_{pop} = \mu_{sample} = 42$

$n = 64$

$\sigma_{pop} = 5$

$\sigma_{sample} = \frac{\sigma_{pop}}{\sqrt{n}} = \frac{5}{8} = 0.625$

at 95% $z = 1.96$

$CI = \mu \pm z SE$

$= 42 \pm 1.96 * 0.0625$

$= 42 \pm 1.225$

$= (40.775, 43.225)$

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8) $ZSE = 1$

95% CI   Z value $= 1.96$

$1.96 * \sigma/\sqrt{n} = 1$

$1.96 \times 1.196 \times 9 = n$

$n = 35$

9) $n = 16$

$\mu_{sample} = 141$

$\sigma_{sample} = 4$

95% = CI

$n = 16 < 30$ - follows T-distribution

$\therefore t = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} =$

$(t_{0.975, 15}) = 2.31$

$CI = \mu \pm t\,SE$

$= 141 \pm 2.31 * 4/\sqrt{16}$

$= 141 \pm 2.31$

$= (138.69, 143.31)$

~~10)~~ $\cancel{\mu} \pm zSE$

10) $= \hat{p} \pm z\sqrt{\frac{P_0(1-P_0)}{n}}$ $z = 1.645$ for 90% CI

$\hat{p} = \frac{3314}{17096} = 0.19$

$= 0.19 \pm 1.645\sqrt{\frac{0.19(1-0.19)}{\cancel{3314}\ 17096}}$

$= 0.19 \pm 1.645\sqrt{\frac{0.19 \times 0.81}{17096}}$

$= 0.19 \pm 0.0049$

$= (0.1851, 0.1949)$

11) μ_{sample} ~~μ_{pop}~~ $= 49$

$n = 100$

$\sigma_{pop} = 4.49$

$\sigma_{sample} = \frac{\sigma_{pop}}{\sqrt{n}} = \frac{4.49}{\sqrt{100}} = \frac{4.49}{10}$

$= 0.449$

$CI = \mu \pm zSE$

$= 49 \pm 1.645 * 0.449$

$= 49 \pm 0.73806$

$(48.2619, 49.73806)$

12) $\hat{p} \pm Z_{\alpha/2} \sqrt{\frac{P_0(1-P_0)}{n}}$

$C.I = 95\%$ $\quad Z_{0.025} = 1.96$

$\alpha = 5\%$

$\hat{p} = \frac{175}{1200} = 0.146$

$0.146 \pm 1.96 \sqrt{\left(\frac{0.146 \times 0.845}{1200} \right)}$

$= 0.146 \pm 0.0198$

$= (0.1262, 0.1658)$

13) $\hat{p} = \frac{15}{59} = 0.25$

$p_0 = 0.5$

$Z_{\alpha/2} = Z_{0.025} = 1.96$

$0.25 \pm 1.96 \sqrt{\frac{0.5 \times 0.5}{59}}$

0.25 ± 0.1276

$= (0.1224 \pm 0.3776)$ = proportion of left handers.

~~TX~~

$(8, 23)$ = true no. of left handers

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14) $ZSE = 100$

$\frac{Z\sigma}{\sqrt{n}} = 100$ $C.I = 90\%$

$\frac{Z\sigma}{100} = \sqrt{n}$ $Z = 1.645$

$\frac{1.645 * 475}{100} = \sqrt{n}$

$n = 61$

15) 68, 42, 51, 57, 56, 80, 45, 39, 36, 79

$\mu = 55.3$

$$\sigma = \sqrt{\frac{(68-55.3)^2 + (42-55.3)^2 + (57-55.3)^2 + (56-55.3)^2 + (51-55.3)^2 + (80-55.3)^2 + (45-55.3)^2 + (39-55.3)^2 + (36-55.3)^2 + (79-55.3)^2}{n}}$$

$$= \sqrt{\frac{161.29 + 176.89 + 2.89 + 0.49 + 18.49 + 610.09 + 10609 + 265.69 + 372.49 + 561.69}{10}}$$

$\sigma_{sample} = 15.09$

$CI = 95\%$

$\mu \pm 2SE$

$= 55.3 \pm 1.96 * \frac{15.09}{\sqrt{10}} = 55.3 \pm 9.35$

$= (45.95, 64.65)$

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