PROBABILITY & STATISTICS Date 10-01-23

ASSIGNMENT # 04

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Class: BSE-3(B) Registration: 79311

QUESTION 10.19.

$\bar{x} = 38$

$\mu = 40$

$\sigma = 5.8$

$n = 64$

$\alpha = 0.4$

Hypothesis are,

$H_0 = \mu = 40$

$H_1 = \mu < 40$

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

$$\bar{z} = \frac{38-40}{5.8/\sqrt{64}}$$

$P(z < -2.76) = 0.029$

For α,

$n = 1$, $\bar{x} = 32$, $\mu = 40$, $\sigma = 5.8$

$$\bar{z}_x = \frac{32-40}{5.8/\sqrt{1}} = -1.38$$

$P(\bar{z} < -1.38) = 0.0838$

$z < z_x$

$0.29 < 0.0838$ (TRUE)

Decision = H_0 will be rejected.

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QUESTION 10.20

$\sigma = 0.24$

$\bar{x} = 5.23$

$n = 64$

$\mu = 5.5$

$\alpha = 0.05$

Hypothesis are,

$H_0 = \mu = 5.5$

$H_a = \mu < 5.5$

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

$$z = \frac{5.23 - 5.5}{0.24/\sqrt{64}}$$

$$\boxed{z = -9.0}$$

$P(z < -9) \approx 0$

$z_\alpha = z_{0.05} = \boxed{-1.645}$

$z < z_\alpha$

$-9 < 1.645$

Decision : H_0 will be rejected.

QUESTION 10.21

$\bar{x} = 788$

$\sigma = 40$

$\mu = 800$

$n = 30$

Hypothesis are,

$H_0 : \mu = 800$

$H_1 : \mu \neq 800$

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

$$z = \frac{788 - 800}{40/\sqrt{30}} \Rightarrow -1.64$$

$$2P(z < -1.64) = 2(0.0505) = 0.1010$$

Hence, the mean isn't significantly different from 800 for $\alpha < 0.101$.

Question 10.22.

$\bar{x} = 8.5$

$\mu = 8$

$\sigma = 2.25$

$n = \sqrt{225}$

$H_0 : \mu = 8$

$H_1 : \mu > 8$

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

$$z = \frac{8.5 - 8}{2.25/\sqrt{225}}$$

$$\boxed{z = 3.33}$$

$P(z > 3.33) = 0.0004$

Decision : Reject H_0

Men who are TM on average, mediate more than 8 ~~Years~~ hrs per week.

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QUESTION 10.23

$\bar{x} = 10.06$

$\sigma = 0.246$

$\mu = 10$

$n = 10$

$\alpha = 0.01$

$df = 9$

$H_0 : \mu = 10$

$H_1 : \mu \neq 10$

Critical Region: $t < -3.25$ or $t > 3.25$

Computation: $t = \frac{10.06 - 10}{0.246/\sqrt{10}}$

$\boxed{t = 0.77}$

Decision : H_0 Accepted.

QUESTION 10.24

$\bar{x} = 165.2$

$\sigma = 6.9$

$\mu = 162.5$

$n = 50$

$H_0 : \mu = 162.5$

$H_1 : \mu \neq 162.5$

$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{165.2 - 162.5}{6.9/\sqrt{50}} = \boxed{z = 2.77}$

$2P(z > 2.77) = 2(0.0028) = 0.0056$

Decision = Reject H_0

$\mu \neq 162.5$

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QUESTION 10.25

$\bar{x} = 23500$
$\sigma = 3900$
$\mu = 20000$
$n = 100$

$H_0 : \mu = 20000$
$H_1 : \mu > 20000$

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

$$z = \frac{23500 - 20000}{3900/\sqrt{100}} = 8.97$$

$P(z > 8.97) \approx 0$

Decision : Reject H_0

$\mu = 720{,}000$ km

QUESTION 10.26

$\bar{x} = 224$
$\sigma = 24.5$
$\mu = 220$
$n = 20$
$\alpha = 0.01$

$H_0 : \mu = 220$
$H_1 : \mu > 220$

$df = 19$

Critical Region : $t > 1.729$.

Computation :-

$$t = \frac{224 - 220}{24.5/\sqrt{20}}$$

$$\boxed{t = 4.38}$$

Decision : Reject H_0 and claim $\mu > 220$ mg.

QUESTION 10.27

$H_0 : \mu_1 = \mu_2$

$H_1 : \mu_1 > \mu_2$

Since,

$$S_p = \sqrt{\frac{29(10.5)^2 + 29(10.2)^2}{58}}$$

$S_p = 10.35$ then

$$P\left[z > \frac{34.0}{10.35\sqrt{1/30 + 1/30}} \right]$$

$$= P(z > 12.72) \approx 0$$

Running increases the mean RMR in older women.