23K-2001

PROB & STATS: A3

Date:

Answer#01:

$\bar{x} = 1.8$, $n = 50$, $\sigma = 1/3$

$1 - \alpha = 0.90$

$\Rightarrow \alpha = 0.1$

$\alpha/2 = 0.05$

$Z_{\alpha/2} = 1.645$

$$\because \bar{x} - Z_{\alpha/2}\frac{\sigma}{\sqrt{n}} < \mu < \bar{x} + Z_{\alpha/2}\frac{\sigma}{\sqrt{n}}$$

$$\Rightarrow 1.8 - (1.645)\frac{1/3}{\sqrt{50}} < \mu < 1.8 + (1.645)\frac{1/3}{\sqrt{50}}$$

$$1.72 < \mu < 1.88$$

Conclusion:

This is greatly lower than the study's reported average of 2.1 hours!

Ans.

Answer#02:

$\bar{x} = 217.7$, $n = 10$, $s = 17.49$, $1 - \alpha = 0.95$, $\nu = n - 1 \Rightarrow \nu = 9$

$\alpha/2 = 0.025$ $t_{\alpha/2} = 2.262$

$$\because \bar{x} - t_{\alpha/2}\frac{s}{\sqrt{n}} < \mu < \bar{x} + t_{\alpha/2}\frac{s}{\sqrt{n}}$$

$$\Rightarrow 217.7 - (2.262)\frac{17.49}{\sqrt{10}} < \mu < 217.7 + (2.262)\frac{(17.49)}{\sqrt{10}}$$

$$205.19 < \mu < 230.21$$

Ans.

Date:

Answer #03:

$\bar{x} = 43,260\$$, $n = 30$, $\sigma = 5230\$$

i.

$H_0: \mu \leq 42,000$

$H_1: \mu > 42,000$

ii.

$\alpha = 0.05$

$z = 1.645$

iii.

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

$z = 1.32$

iv.

$\because 1.32 < 1.645$

Accept H_0!

Ans.

Based on our test, we cannot conclude that they earn more than \$42,000.

Answer #04:

$\bar{x} = \$26.64$ billion , $\sigma = \$28.7$ billion, $n = 50$

i.

$H_0 \Rightarrow \mu \leq 24$ billion

$H_1 \Rightarrow \mu > 24$ billion

ii.

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

$z = 0.65$

iii.

$P(z > 0.65) = 0.2578$

iv.

$\because 0.2578 > 0.05$

Accept H_0! Ans.

There is not enough evidence to support the claim.

Date:

Answer #05:

$n = 20$, $\bar{x} = 3.85$, $\alpha = 0.05$, $s = 2.52$

i.

$H_0 : \mu = 5.8$

$H_1 : \mu \neq 5.8$

ii.

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

$z = -3.46$

iii.

$v = 19$

$t_{\alpha/2} = \pm 2.093$

iv.

$-3.46 < -2.093$

Reject H_0! Ans.

There is not enough evidence to conclude that the average is not 5.8 visits per year.

Date:

Answer #06:

Material 01: $n_1 = 12$, $\bar{x} = 85$, $\sigma = 4$

Material 02: $n_2 = 10$, $\bar{x} = 81$, $\sigma = 5$

$\alpha = 0.05$

i.

$H_0: \mu_1 - \mu_2 \leq 2$

$H_1: \mu_1 - \mu_2 > 2$

ii. $s_p = \sqrt{\frac{11 \times 16 + 9 \times 25}{20}}$

$s_p = 4.55$

iii. $t = \frac{(\bar{x}_1 - \bar{x}_2) - d}{s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$

$t = \frac{(85-81) - 2}{4.55\left(\sqrt{\frac{1}{12} + \frac{1}{10}}\right)}$

$t = 1.01$

iv.

$v = n_1 + n_2 - 2 = 20$

v. critical value of $t = 1.725$

vi.

$\therefore 1.01 < 1.725$

Accept H_0! Ans.

Based on the test, we cannot conclude that the abrasive wear of material 1 exceeds that of material 2 by more than 2 units.

23K-2001

BCS-4J