Student Information

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Answer 1

a)This sample has size n = 10 and sample mean $\bar{X} = 16.96$. **To attain a confidence level of,**
1 - $\alpha = 0.9$
we need $\alpha = 0.1$ **and** $\alpha/2 = 0.05$. **Therefore, we are looking for quantiles**
$q_{0.05} = -z_{0.05}$ **and** $q_{0.95} = z_{0.05}$
From the course book's Table we get the value $z_{0.05} = 1.645$
$\bar{X} \pm z_{\alpha/2}\frac{\sigma}{\sqrt{n}} = 16.96 \pm (1.645)\frac{3}{\sqrt{10}} = 16.96 \pm 1.56058$

for 99 percent confidence part, we have:

1 - $\alpha = 0.99$
we need $\alpha = 0.01$ **and** $\alpha/2 = 0.005$. **Therefore, we are looking for quantiles**
$q_{0.005} = -z_{0.005}$ **and** $q_{0.995} = z_{0.005}$
From the course book's Table we get the value $z_{0.005} = 2.576$
$\bar{X} \pm z_{\alpha/2}\frac{\sigma}{\sqrt{n}} = 16.96 \pm (2.576)\frac{3}{\sqrt{10}} = 16.96 \pm 2.4438$

b) In order to attain a margin of error Δ **for estimating a population mean with a confidence level (1-**α),

a sample of size n$\geq (\frac{z_{\alpha/2} * \sigma}{\Delta})^2$ *is required.*
$\sigma(\hat{\theta}) = 1.55$ **which is the margin.**

We have that $\Delta = 1.55$ *and* $\sigma = 3$. **By the formula given above, we need to find the sample.** $(\frac{z_{\alpha/2} * \sigma}{\Delta})^2 = (\frac{(2.326) * 3}{1.55})^2 = =$ **20.26742**

Answer 2

a)No, because only the mean and the sample size is not enough for the statistics for ratings. We need another requirement to measure data. That requirement is called standard deviation.

Hence, standard deviation also is needed for computation.

b)We need to use alternative hypothesis here because we need to use $\mu > 7.5$.

We know that mean is equal to 7.4, and the standard deviation is 0.8.

Sample size is given as 256.

From z test, we get the equation:

z$= \dfrac{\bar{X} - \mu}{\sigma/\sqrt{n}}$

z $= \dfrac{7.4 - 7.5}{0.8/16} =$ **-2**

Secondly, we need to find the critical value from z_α.

$\alpha =$ **0.05 and** $z_\alpha = 1.645$. **Therefore, our critical value is 1.645.**

With a left-tail alternative, we should

$reject\ H_0\ if\ Z\ \leq\ -z_a$

$accept\ H_0\ if\ Z\ >\ -z_a$

Since -2 as z's value, greater than the critical value of 1.645(using -z).

We reject the null hypothesis because of the left -tail alternative hypothesis. Therefore, we can say that it is not included in the list of candidate restaurants to order food from.

c)Now, the standard deviation is changed to 1.

So our z value is = z $= \dfrac{7.4 - 7.5}{1/16} =$ **-1.6**

Again, using the left-tail alternative hypothesis, 1.645>-(-1.6) we accept the null hypothesis.

Therefore, we can say that it is included in the list of candidate restaurants to order food from.

d)The value given is already greater than the 7.5 which is the rating we want as minimum. Therefore, standard deviation is not required and we do not have to resort any statistical tests.

Answer 3

$ComputerA => \bar{X}_1 = 211, s_1 = 5.2, n_1 = 20$
$ComputerB => \bar{X}_2 = 133, s_2 = 22.8, n_2 = 32$
$H_0 : \mu_1 - \mu_2 \geq 90$
$H_1 : \mu_1 - \mu_2 < 90$

a)Pooled variance:

$$S_p^2 = \frac{(n_1 - 1) * s_1^2 + (n_2 - 1) * s_2^2}{n_1 + n_2 - 2} = \frac{(20 - 1) * 5.2^2 + (32 - 1) * 22.8^2}{20 + 32 - 2} = 332.57$$

Test statistic t $= \dfrac{\bar{X}_1 - \bar{X}_2 - (\mu_1 - \mu_2)}{\sqrt{s_p^2 * (\frac{1}{n_1} + \frac{1}{n_2})}} = (211 - 133 - 90)/\sqrt{(332.57 * (0.05) + 1/32)} = -2.3$

degrees of freedom $= n_1 + n_2 - 2 =$ **50**

P = t distribution of (-2.3,50,1) = 0.0126

$P > \alpha$ **so that we do not reject the null hypothesis.**

Therefore, we conclude that there is enough information that the computer B provides a 90-minute or better improvement at 0.01 significant level.

b) test statistic t= $\dfrac{(\bar{X}_1 - \bar{X}_2 - (\mu_1 - \mu_2))}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}} = (211 - 133 - 90)/\sqrt{(5.2^2/20 + 22.8^2/32)} = -2.86$

degrees of freedom $= ((s_1^1/n_1 + s_2^2/n_2)^2/[(s_1^2/n_1)^2/(n_1 - 1) + s_2^2/n_2)^2/(n_2 - 1)] = 35.9682 = 35$

P = t distribution of (-2.86,35,1)=0.0035

$P < \alpha$ **so that we do reject the null hypothesis.**

Therefore, we can conclude that there are not enough evidence to conclude that the computer B provides a 90-minute or better improvement at 0.01 significant level.