

STAT100 Elementary Statistics and Probability Summer II 2014

Quiz 9, Wednesday, August 13, 2014

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Show all work clearly and in order, and circle your final answers. Justify your answers algebraically whenever possible. You are allowed to calculator for basic calculation in this quiz. You have 10 minutes to take this 10 point quiz.

To study the height of the students in UMD, we randomly picked 9 students and measure their heights. The results are given as follow (in centimeter)

170 172 164 180 160 162 170 164 170

1. (5 points) Find the 90% confidence interval of the average height of UMD students.

$$\bar{X} = \frac{170+172+164+180+160+162+170+164+170}{9} = 168$$

$$S^2 = \frac{1}{8} (2^2 + 4^2 + (-4)^2 + 12^2 + (-8)^2 + (-6)^2 + 2^2 + (-4)^2 + 2^2) = 38$$

We have $\bar{X} = 168$, $S = \sqrt{38} \approx 6.164$, $n = 9$, $d.f. = 8$

$$\alpha = .1 \Rightarrow t_{\alpha/2} = t_{.05} \stackrel{d.f.=8}{=} 1.860$$

Therefore, the 90% confidence interval is

$$\left[168 - 1.860 \cdot \frac{6.164}{3}, 168 + 1.860 \cdot \frac{6.164}{3} \right] = [164.178, 171.822]$$

2. (5 points) Take $\alpha = .05$. Do these data provide strong evidence that the average height of UMD students is more than 167cm? (Form the testing hypotheses, set up the rejection region, determine if the null hypothesis is rejected or retained, and draw a conclusion.)

$$H_0: \mu = 167 \quad H_1: \mu > 167$$

We reject H_0 if $T > t_{\alpha}$ where

$$T = \frac{\bar{X} - \mu_0}{S/\sqrt{n}} \text{ is the test statistic with value}$$

$$\frac{168 - 167}{6.164/3} = 0.487$$

$$\text{and } t_{\alpha} = t_{.05} \stackrel{d.f.=8}{=} 1.860$$

As $0.487 < 1.860$, we retain H_0 .

Conclusion: data does not provide strong evidence that the average height is more than 167cm.