

Simple Hypotheses*

Worksheet 19

1. The body temperature in degrees Fahrenheit of $n = 40$ randomly chosen healthy adults is measured. The standard deviation σ is known to be 0.68 degrees Fahrenheit. The sample mean for the measurements is $\bar{x} = 98.37$.

- (a) Find a 99% confidence interval for the mean body temperature and explain its meaning.
- (b) Consider the simple hypothesis for the mean body temperature in degrees Fahrenheit

$$H_0 : \mu = 98.6 \quad \text{versus} \quad H_1 : \mu = 98.4.$$

Give the critical value for \bar{x} , the sample mean body temperature when the significance level $\alpha = 0.05, 0.02,$ and 0.01 .

- (c) Do these critical values increase, decrease, or stay the same in the number of healthy adults chosen increases to $n = 50$? Explain your answer.
- (d) The data have sample mean $\bar{x} = 98.37$. For $n = 40$ and each value of α , report whether or not we reject the null hypothesis? Explain your answer.
- (e) Find the power of the test in part (b) for each significance level.

| | | | |
|-------|--------------|------|------|
| | significance | | |
| | 0.05 | 0.02 | 0.01 |
| power | | | |

- (f) Fill in the following table with the number of observations n^* necessary for the given level of significance α and power $1 - \beta$.

| | | | |
|-------|--------------|------|------|
| | significance | | |
| power | 0.05 | 0.02 | 0.01 |
| 0.80 | | | |
| 0.90 | | | |
| 0.95 | | | |

- (g) Which value n^* is the highest? lowest? Explain your answer.
- (h) For $\alpha = 0.01$, indicate the power using the critical value for the test and drawing the density of the sample mean \bar{X} for the null and alternative hypothesis.

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