

2008  
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Dr. Lunsford

MATH171 – Statistical Decision Making  
Quiz 4

Name: Solution  
40 Points Total

**Problem I.** In a discussion of the education level of the American workforce, a pessimist says, “The average young person can’t even balance a checkbook.” The National Assessment of Adult Literacy (NAAL) survey indicates that a score of 289 or higher on its quantitative test reflects skills that include those needed to balance a checkbook. The NAAL administered the test to a random sample of 1001 young American men (aged 19 to 24). Their mean score was 279, a bit below the checkbook-balancing level. The standard deviation of the scores was 103. Please answer the following questions. (20 points total)

(a) Please describe the population of interest. (2 points) *All young American men age 19 to 24.*

(b) What is the variable being measured on the population? Is it quantitative or categorical? (2 points)

*The score on the NAAL survey. It is quantitative.*

(c) What is the population parameter of interest? Clearly describe this parameter in the context of this problem. (2 points)

*Let  $\mu$  be the mean (i.e. average) score on the NAAL survey for all young American men age 19 to 24. Then  $\mu$  is the parameter of interest.*

(d) State the hypotheses that would test the pessimist’s conjecture. (3 points)

$$H_0: \mu = 289$$
$$H_a: \mu < 289 \text{ (Pessimist's conjecture)}$$

(e) What statistical test will you run to test the above hypotheses and what assumptions must you make in order to conduct the test? Please state the assumptions in the context of this problem. (3 points)

*t-test; we assume we have a SRS from all young American men age 19 to 24.*

*We assume test scores on the NAAL survey are normally distributed for all young American men age 19 to 24.*

(f) Find the test statistic and p-value of your test. Please show all calculator input. Clearly indicate your answers. (4 points)

$$\text{Test statistic} = -3.07$$

$$\text{p-value} = .0011$$

$$t \text{ test: } \mu_0 = 289, \bar{X} = 279, S_x = 103, n = 1001, \mu < \mu_0$$

(g) What is your conclusion in the context of this problem, i.e. is the pessimist correct? You should justify your answer based on the value of your p-value in part (f). (4 points)

*Since our p-value is small ( $p = .0011 < .01$ ) we reject  $H_0$  in favor of the alternative. Thus the average score for all young American men on the NAAL is significantly below the level needed to balance a checkbook (i.e.  $< 289$ ). Thus the pessimist is correct (at least for young American men).*

