Quiz 4

Key

You are welcome to use a calculator for this quiz, but realize the incorrect answer with no supporting work will receive no partial credit.

1. In a discussion of the education level of the American workforce, someone says, "The average young person can't even balance a checkbook.". The National Assessment of Educational Progress says that a score of 275 or higher on its quantitative test reflects the skill needed to balance a checkbook. The NAEP random sample of 840 young men had a mean score of $\bar{x} = 272$, a bit below the checkbook-balancing level. Assume NAEP scores have a Normal distribution with $\sigma = 60$.

example
15.9
B 375

(a) [1] Give a 95% confidence interval for the average quantitative score of young men.

68-95-99.7 Rule: $\bar{x} \pm 2\left(\frac{\sigma}{\sqrt{n}}\right) = 272 \pm 4.14$
or (267.9, 276.1)

Table C: $\bar{x} \pm 1.960\left(\frac{\sigma}{\sqrt{n}}\right) = 272 \pm 4.06$
or (267.9, 276.1)

Calc 2-Interval (267.9, 276.1)

let μ be the average quantitative score of young men.

(b) [2] Explain what it means to be 95% confident that the average quantitative score is in the interval you gave as an answer above. (Explain what a 95% confidence interval is.)

"If you took SRS many times, about 95% of the intervals calculated should catch μ."

"A 95% confidence interval means that if you took many SRS and calculated each confidence interval, the population mean μ could be caught in approximately 95% of them."

"The μ had a 95% chance of being caught in the range of (267.94, 276.057)."

Complete the following steps to decide if the results reported on the previous page are good evidence that the average young man can't balance his checkbook.

(c) [1] Explain carefully what μ is.

μ is the average score of the quantitative score of young men

Note: σ is given for this in part a

(d) [2] State the null and alternative hypotheses you will use.

$H_0: \mu = .275$

$H_a: \mu < .275$ ie ave young man's quantitative score is too low to balance his check book.

(e) [1] Calculate the P-value.

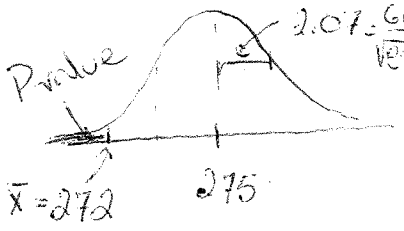

Table A: z-stat $\frac{272-275}{\frac{60}{\sqrt{10}}} = -1.45$ → .0735

normalcdf(-10000, 272, 275, $\frac{60}{\sqrt{10}}$) = .0736

Z-TEST Stats $\mu_0 = 275$ $\bar{x} = 272$ $s = 60$ $n = 10$ → .0736

(f) [2] What is the P-value measuring in this case? (Explain what the P-value is.)

The probability that an SRS could have scores as low as ours - or more, if the ave score of young men really was 275.

(g) [1] Is there good evidence to suggest that the average young man can't balance his checkbook?

This is significant at the 10% level but not at the 5% level. So, there is modest evidence (at the 10% level) that the ave score of young men's quantitative score is below the level necessary to balance his checkbook.