

MATH-111 (DUPRÉ) 7 NOVEMBER 2008 QUIZ IN LECTURE

1. _____-PRINT LAST NAME (IN LARGE CAPITALS):
2. _____-PRINT FIRST NAME (IN CAPITALS):
3. _____-CIRCLE LAB DAY—-T—-TH
4. _____-CIRCLE LECTURE HOUR—-11AM—-1PM
5. ANSWERS MUST BE CORRECT TO THREE SIGNIFICANT DIGITS

6. SUPPOSE THAT FISH WEIGHT IS NORMALLY DISTRIBUTED WITH MEAN, μ , UNKNOWN AND STANDARD DEVIATION $\sigma = 7$ POUNDS. SUPPOSE WE HAVE A SAMPLE OF SIZE $n = 35$ WITH SAMPLE MEAN $\bar{x} = 43$.

A. What is the 95 percent confidence interval for the true mean, μ ?

You can find the answer easily by using the z-interval in the test menu of the calculator. Set $\sigma = 7$, set $\bar{x} = 43$, set $n = 35$, and set C -level as $C = .95$. The readout says

$$(40.681, 45.319)$$

which means that we can say

$$40.681 \leq \mu \leq 45.319,$$

with 95 percent confidence. Alternately, you can use the result of the next problem which is that the margin of error, $MofE$, is 2.319 which means we can just as well say

$$\mu = 43 \pm 2.319$$

and as $43 - 2.319 = 40.681$ and $43 + 2.319 = 45.319$, we again end up with the same 95 percent confidence interval.

B. What is the MARGIN OF ERROR of the 95 percent confidence interval for the true mean, μ ?

You can easily find the answer to this quickly be going back into the z-interval and simply changing \bar{x} to $\bar{x} = 0$. The resulting readout gives

$$(-2.319, 2.3191)$$

which means that we can say our margin of error is only 2.3191 with 95 percent confidence. There are three other ways to work this problem. First, we can use the answer from the previous question and compute $(45.319 - 40.681)/2 = 2.319$. Second, knowing $\bar{x} = 43$, we can simply compute $45.319 - 43 = 2.319$. Or third, we can use the margin of error formula,

$$MofE = z \frac{\sigma}{\sqrt{n}},$$

where $z = invNorm(.975, 0, 1) = 1.959963986$ to find that the margin of error is only 2.319060663 with 95 percent confidence. Notice this last way gives much more accuracy, but of course, this level of accuracy may not be justified if the data is not observed with high accuracy. Finally, as pointed out in the answer to the previous problem, the margin of error can be used together with $\bar{x} = 43$ to find the confidence interval. BOTH PROBLEMS ARE REALLY THE SAME PROBLEM-JUST DIFFERENT WAYS OF GIVING THE ANSWER.