

Session details: Maths - Maths advanced Monday, 15 September 2014 - 04:28PM

Student:

Just need some assistance with a probability question.

A survey is planned to determine what proportion of the high-school students in a metropolitan school system have regularly smoked marijuana. If no estimate of p is available from previous studies, a pilot sample cannot be drawn.

Tutor:

Hi there, is there more to the question?

Student:

(a) What sample size is needed to estimate the true proportion to $\pm 6\%$ with 96% confidence? i've attached the formula need above i've also rearranged it so we can find n^* because thats the unknown.

Tutor:

Okay so have you had a go at substituting values into the formula?

Student:

yeah i'll try writing on the white board... sorry if its messy how is that?

[See end of document]

Tutor:

Hm when you squared everything to get rid of the square root, wouldn't z^2 become z^4 ?

Student:

i don't so....because we moving to the other side where d is

Tutor:

Sorry, I think there should just be z in the originally formula and then z^2 in your rearranged formula.

If you moved the z^2 to the other side you have $d / z^2 = \text{square root } ()$

Then you need to square both sides to get rid of the square root.

So you have $(d/z^2)^2$

So you have d^2 / z^4

Do you follow that?

Student:

yeah (:

so that for the p hat in my text book it says when the value is unknown use 0.5

Tutor:

Can you double check your first formula is correct, that there is z^2 and not just z ?

Student:

yeah in my text book the original formula consists of the Z^2

Tutor:

Okay that's fine, just make sure you have z^4 in the rearranged equation.

Okay yep p hat = 0.5, what about the z -score?

Student:

so $96 - 4 = 6$

sorry $100 - 96 = 4$

so 0.04

but then you have to half it

so we get 2

0.02 sorry

Tutor:

You need a z-score table to get the z-score.

Have you got a z-score table with you?

Student:

so then you minus 100 -0.02 to get 98%

at the back of my text back the z score for the 98% is 2.05

Tutor:

Ah I see. Yes that looks good.

Student:

sorry if im making it confusing

I'll try fill in the formula now

does that seem to be correct?

Tutor:

It's z^4 . And the z score is just 2.05, you don't need to multiply it by the 0.02. The 0.02 is a subscript to the z, not next to the z.

Once you have found the z-score using the 0.02, you can drop the 0.02 part.

Student:

and also the Z^2 is correct, i think the problem is up on the white board thats not an equal sign after the z^2

Tutor:

I am not sure what you mean?

Student:

sorry, i don't understand why the z^2 is Z^4 .

sorry about that.

Tutor:

If you moved the z^2 to the other side you have $d / z^2 = \text{square root } ()$

Then you need to square both sides to get rid of the square root

So you have $(d/z^2)^2$

So you have d^2 / z^4

How does that sound to you?

Please type/draw something so I know our connection is active.

Please let me know if you want me to clarify a point or something in my explanation

Student:

oh thank you so much... its just one of those days where im so slow /:

Tutor:

That's okay, the equation can be quite confusing.

Do you understand why we can get rid of the 0.02 when you substitute numbers into the equation?

Student:

as you said above once we find the z score we can drop it

because thats what we used to get that z score (:

Tutor:

Yes great, so now can you find n?

Student:

i got 1226

does that seem reasonable?

Tutor:

Yes great so that's the answer.

Student:

thank you so much.....

many thanks (:

Tutor:

You're welcome! We have worked through a fair bit and you're doing great! I will have to ask you to log back in if you have further questions and a tutor will help you out shortly.

Remember, you can check out our other subject areas as well. Good luck with your studies :)

Whiteboard 1

$$d = Z_{1-\frac{\alpha}{2}} \times \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

↓

$$n = \frac{\hat{p}(1-\hat{p}) \times Z_{1-\frac{\alpha}{2}}^2}{d^2}$$
$$n = \frac{0.5(1-0.5) \times 2.05^2}{0.06^2}$$