

# Proper (math) hygiene

*MATH 202*

*Fall 2023*

The whole problem with the world is that fools and fanatics are always so certain of themselves, and wiser people so full of doubts.

Bertrand Russell

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## Let's Play True or False

**True or False:** teddy bear, stinkbug, guacamole.

**Answer** This is not a statement—it's a list of things; it doesn't have a truth value. I'd say it's a trick question.

## True or False redact

**True or False:** In my house this morning, you'll find either a teddy bear, a stinkbug, or guacamole.

**Answer** This is true. This morning I opened my fridge. On the middle shelf there was a container that passed the guacamole color, texture, and taste test; therefore it is true that in my house this morning, you'll find either a teddy bear, a stinkbug, or guacamole.

## Now with math

**Question** Is the following work correct?

$$\int_3^4 x \, dx = \frac{1}{2}x^2 \Big|_3^4 = \frac{7}{2}$$

**Answer** Just like the list “teddy bear, stinkbug, guacomole,” this is a list of things. As such, it’s not a statement, and it doesn’t have a truth value. It’s another trick question.

**Question** Is the following work correct?

$$\int_3^4 x \, dx = \frac{1}{2} x^2 \Big|_3^4 = \frac{7}{2}$$

**Answer** Yes, this work is correct. This time we're given something that has a truth value. And its truth value is true.

# The Mad Gardener

**Question** Is this work correct? (Lewis Carroll, From *The Mad Gardener's Song*)

*He thought he saw an Argument  
That proved he was the Pope:  
He looked again, and found it was  
A Bar of Mottled Soap.  
"A fact so dread," he faintly said,  
"Extinguishes all hope!*

**Answer** It's amusing nonsense poetry—it's meaningless and neither correct nor incorrect. Another trick question.

**Question** Is this work correct?

$$\begin{aligned}\int_2^3 \sqrt{x+1} \, dx &= \int \sqrt{z} \\ &= \int \frac{3}{2} (1+z)^{3/2} \\ &= \frac{3}{2} (4^{3/2} - 3^{3/2})\end{aligned}$$

**Answer** Unlike the *The Mad Gardener's Song*, this is **nonamusing** nonsense. It's meaningless and neither correct nor incorrect. It's yet another trick question.

**Comment** Work like this (a) confuses me (b) should confuse you, and (c) is the result of **abject sloth**.

Let  $z = x + 1$ . Then  $dz = dx$ . Further  $x = 2$  implies  $z = 3$ ; and  $x = 3$  implies  $z = 4$ . Now that we have gathered our four ingredients, we have

$$\begin{aligned}\int_2^3 \sqrt{x+1} \, dx &= \int_3^4 \sqrt{z} \, dz, \\ &= \frac{2}{3} z^{3/2} \Big|_3^4, \\ &= \frac{2}{3} \left( 4^{3/2} - 3^{3/2} \right).\end{aligned}$$



# First Amendment Rights

**Question** Which answer is simplified:

$$\int_2^3 \sqrt{x+1} \, dx = \frac{2}{3} (4^{3/2} - 3^{3/2})$$

or

$$\int_2^3 \sqrt{x+1} \, dx = \frac{16}{3} - 2\sqrt{3}$$

**Answer** Arguably  $\frac{16}{3} - 2\sqrt{3}$  is more simple than is  $\frac{2}{3} (4^{3/2} - 3^{3/2})$  because it has one, not two radicals. But I consider this a first Amendment Rights issue. Either answer is OK. If your answer is  $\frac{2}{3} (4^{3/2} - 3^{3/2})$  and you like it, I say let it be (LIB).