Given an indefinite integral

\[ F(x) = \int f(x) \, dx \]

with an integrand \( f(x) \) that involves a nested function.

(1) Identify the inner function. It will be a function of the variable \( x \). Write the equation \( \text{inner}(x) = u \) to introduce the single letter \( u \) to represent the inner function. Circle the equation \( \text{inner}(x) = u \).

(2) Find \( \frac{du}{dx} \). Your result should be an equation of the form \( \frac{du}{dx} = \text{inner}'(x) \). Then use \( \frac{du}{dx} \) to build a new equation that expresses \( dx \) in terms of \( du \). To do this, write \( dx = \frac{1}{\frac{du}{dx}} \, du \).

That is, \( dx = \frac{1}{\text{inner}'(x)} \, du \). Circle this new equation \( dx = \frac{1}{\text{inner}'(x)} \, du \).

(3) Notice that in steps (1) and (2) you have two circled equations. Substitute these into the integrand of your indefinite integral. Cancel as much stuff as possible and simplify by moving multiplicative constants outside the integral.

The result should be a new indefinite integral with an integrand that is a function involving the variable \( u \). Important things to note at this point:

- There should be no \( x \) in the new indefinite integral. If there is an \( x \) in the integral, then either you have made a mistake or the original integral was not one that can be solved using the method of substitution.
- The new indefinite integral does not involve a nested function.

(4) Solve the new indefinite integral by using the antiderivative rules. The result should be a new function involving \( u \).

(5) Substitute \( u = \text{inner}(x) \) into your function from step (4) The result should be a new function of just the variable \( x \). This is \( F(x) \).

(6) Check by finding \( F'(x) \). If \( F'(x) = f(x) \), then your work was correct.