Arc Length of $y = \ln(x)$

Express the arc length of the graph of $y = \ln x$ between $x = 1/10$ and $x = 1$ as an integral. (Do not evaluate.)

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$$y' = \frac{1}{x}$$

$$S = \int \sqrt{1 + y'^2}\, dx$$

$$= \int_{1/10}^{1} \sqrt{1 + \left(\frac{1}{x}\right)^2}\, dx$$

$$= \int_{1/10}^{1} \sqrt{\frac{x^2+1}{x^2}}\, dx$$

$$= \int_{1/10}^{1} \frac{\sqrt{x^2+1}}{x}\, dx$$