PROBLEM

$$\frac{d^n}{dx^n}(\log x) =$$

a. $\dfrac{(n-1)!}{x^n}$

b. $\dfrac{n!}{x^n}$

c. $\dfrac{(n-2)!}{x^n}$

d. $(-1)^{n-1}\dfrac{(n-1)!}{x^n}$

SOLUTION

. d. Let $y = \log x$. Then,

$$y_1 = \frac{1}{x}, y_2 = \frac{-1}{x^2}, y_3 = \frac{2}{x^3}, \cdots, \quad y_n = \frac{(-1)^{n-1}(n-1)!}{x^n}.$$