7B. For the curve \( y = 2 \, x^{3/2} \), find the exact length of the arc between \( x = 0 \) and \( x = 1 \).

**SOLUTION.** The formula for arclength of a curve with equation \( y = f(x) \) between \( x = a \) and \( x = b \) is

\[
L = \int_a^b \left[ 1 + f'(x)^2 \right]^{1/2} \, dx.
\]

In this case, \( f(x) = 2 \, x^{3/2} \), so \( f'(x) = 3x^{1/2} \); \( a = 0 \) and \( b = 1 \). Thus,

\[
L = \int_0^1 \left[ 1 + 9x \right]^{1/2} \, dx = \left( \frac{1}{9} \right) \left( \frac{2}{3} \right) [1 + 9x]^{3/2} \bigg|_0^1 = \left( \frac{2}{27} \right) [10^{3/2} - 1]
\]