Thus, the arc length function is given by

$$= \int_1^x \left(2t - \frac{1}{8t}\right) dt = t^2 + \tfrac{1}{8}\ln t\Big]_1^x$$
$$= x^2 + \tfrac{1}{8}\ln x - 1$$

For instance, the arc length along the curve from (1, 1) to $(3, f(3))$ is

$$s(3) = 3^2 + \tfrac{1}{8}\ln 3 - 1 = 8 + \frac{\ln 3}{8} \approx 8.1373$$

□ Figure 8 shows the interpretation of the arc length function in Example 4. Figure 9 shows the graph of this arc length function.

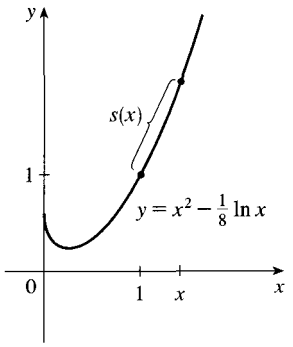

FIGURE 8

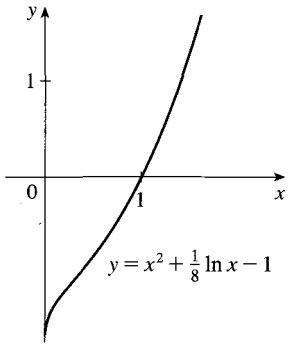

FIGURE 9

8.1 Exercises

19–22 □ Set up, but do not evaluate, an integral for the length of until it hits the ground, where y is its height above the ground