Minimum Arc Length Challenge

Give an example of a continuous function f that satisfies three conditions:

(1) $f(x) \geq 0$ on the interval $0 \leq x \leq 1$;

(2) $f(0) = 0$ and $f(1) = 0$;

(3) $\displaystyle\int_0^1 f(x)\,dx = 1$

Compute the arc length, L, for the function f (on $[0, 1]$). The goal is to minimize L given the three conditions above.