Oscillator Integral

Find the value of the integral

\[ I = \int_{x_1}^{x_2} \frac{dx}{\sqrt{(x - x_1)(x_2 - x)}} \]

by relating it to the motion of an ideal oscillator and just reading off the answer. You can also just take the integral, of course, but this is too trivial.
Half-period of an oscillator is

\[ T/2 = \frac{\pi}{\omega} = \int_{x_1}^{x_2} \frac{dx}{\sqrt{2(E - U(x))}} \]

where \( U(x) = \omega^2 f(x)/2 \) - is some quadratic function, which we can write

\[ 2E - U(x) = \omega^2 (2E/\omega^2 - f(x)) = \omega^2 (x - x_1)(x_2 - x) \]

where \( x_{1,2} \) are the turning points. And so

\[ I = \pi \]