The figure are right shows the graphs of $f''(x)$ and $f^{(4)}$ for the function

$$f(x) = \sqrt{1 - 0.25 \cos(x)^2}$$

on the domain $0 \leq x \leq \pi/2$. Compute

$$\int_0^{\pi/2} \sqrt{1 - 0.25 \cos(x)^2} \, dx$$

to within $10^{-4}$. Use any methods except the integration function on a calculator or computer. Show all work. Include work that proves your answer is within $10^{-4}$ of the exact answer.