

8.

$$\begin{aligned} & \lim_{n \rightarrow \infty} \left(\sum_n^{2n-1} \frac{1}{2\sqrt{nk}} \right) \\ &= \frac{1}{2} \lim_{n \rightarrow \infty} \left(\sum_n^{2n-1} \frac{1}{n} \times \sqrt{\frac{n}{k}} \right) \\ &= \frac{1}{2} \lim_{n \rightarrow \infty} \left(\sum_n^{2n-1} \frac{1}{n} \times \frac{1}{\sqrt{\frac{k}{n}}} \right) \\ &= \frac{1}{2} \int_1^2 \frac{1}{\sqrt{x}} dx \\ &= \frac{1}{2} \left(2x^{\frac{1}{2}} \right) \Big|_1^2 \\ &= (\sqrt{2} - 1) \end{aligned}$$