

Evaluate  $\int_1^9 \frac{y-1}{\sqrt{y}} dy$

- $I = [1, 9]$  is a closed interval.
- $f(x) = \frac{y-1}{\sqrt{y}}$  is continuous on  $I$ .
- $$F(x) = \int \frac{y-1}{\sqrt{y}} dy = \int \frac{y}{\sqrt{y}} dy - \int \frac{1}{\sqrt{y}} dy$$
$$= \int \sqrt{y} dy - \int y^{-\frac{1}{2}} dy$$
$$= \frac{2}{3} \cdot y^{\frac{3}{2}} - 2 \cdot \sqrt{y} + C$$

Then, by using Fundamental theorem of Calculus

$$\int_1^9 \frac{y-1}{\sqrt{y}} dy = \left[ \frac{2}{3} \cdot y^{\frac{3}{2}} - 2 \cdot \sqrt{y} \right]_1^9$$

$$= \frac{2}{3} \cdot \left[ y^{\frac{3}{2}} \right]_1^9 - 2 \cdot \left[ \sqrt{y} \right]_1^9 = \frac{40}{3}$$