

Question 8

Cylinder volume is $V(r, h) = \pi r^2 h$.

Tasks

1. Interpret V_r, V_h geometrically.
2. Evaluate at $(3, 10)$ cm.
3. Estimate separate effects of 0.1 cm increases.

Question 8 – Solution

Strategy. Connect derivatives to familiar areas.

Step 1: Geometry $V_r = 2\pi rh$ is circumference times height; $V_h = \pi r^2$ is base area.

Step 2: Values $V_r = 60\pi \text{ cm}^2$, $V_h = 9\pi \text{ cm}^2$.

Step 3: Estimates $\Delta V_r \approx 6\pi \text{ cm}^3$ and $\Delta V_h \approx 0.9\pi \text{ cm}^3$. The radial change has the larger first-order effect.