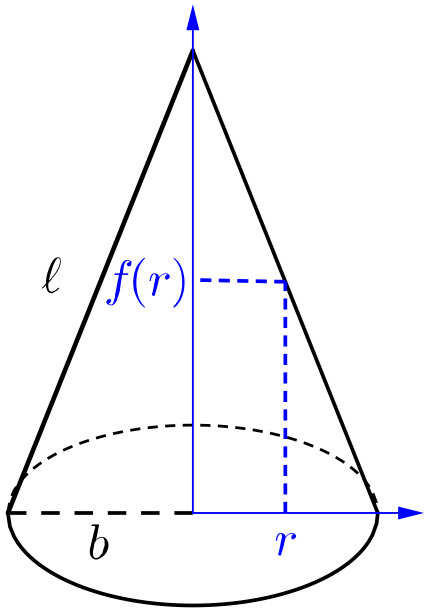
Surface Area



Question

If the graph of a function of (x, y) is a surface of revolution about the z-axis, then $z = f(r)$ and the surface area over the disk D can be computed by

$$\text{Area} = \iint_D \sqrt{1 + (f'(r))^2}\, r\, dr\, d\theta.$$

Which integral computes the surface area of the cone shown?

A. $\displaystyle\int_0^{2\pi}\int_0^b r\sqrt{1+\frac{\ell^2-b^2}{b^2}}\, dr\, d\theta$

B. $\displaystyle\int_0^{2\pi}\int_0^b \sqrt{1+\frac{\ell^2-b^2}{b^2}}\, dr\, d\theta$

C. $\displaystyle\int_0^{2\pi}\int_0^b r\sqrt{1+\left(\frac{\ell^2-b^2}{b^2}\right) r^2}\, dr\, d\theta$

D. $\displaystyle\int_0^{2\pi}\int_0^b r\sqrt{1+\left(\frac{\ell^2-b^2}{b^2}\right)(b-r)^2}\, dr\, d\theta$