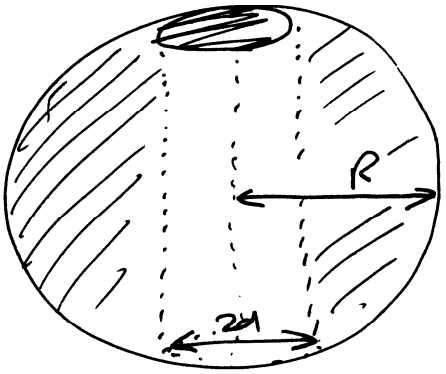
CONSIDER A SPHERE OF RADIUS R AND CIRCULAR HOLE 2d DRILLED THROUGH ALONG AXIS OF SYMMETRY.



SHOW THAT VOLUME OF DRILLED SPHERE IS:

$$V = \frac{4}{3}\pi\left[R^2 - d^2\right]^{3/2}$$

BY USING MULTIPLE INTEGRAL I HAVE

$$V_{SPHERE} = 4\pi\int_0^R r^2\,dr = \frac{4}{3}\pi R^3$$

I THINK I NEED TO CALCULATE THE AREA OF THE HEMISPHERE AT THE TOP OF THE SPHERE, MULTIPLY BY 2L TO GIVE THE VOLUME OF THE DRILLED HOLE. THEN

$$V = Vol_{SPHERE} - Vol_{HOLE}$$

BUT I CANNOT CALCULATE V_{HOLE}. PLEASE HELP.

NB AREA OF SURFACE $= \int_S g(x,y)\,dA \qquad g(x,y) = \sqrt{1 + \left(\frac{\partial f}{\partial x}\right)^2 + \left(\frac{\partial f}{\partial y}\right)^2}$