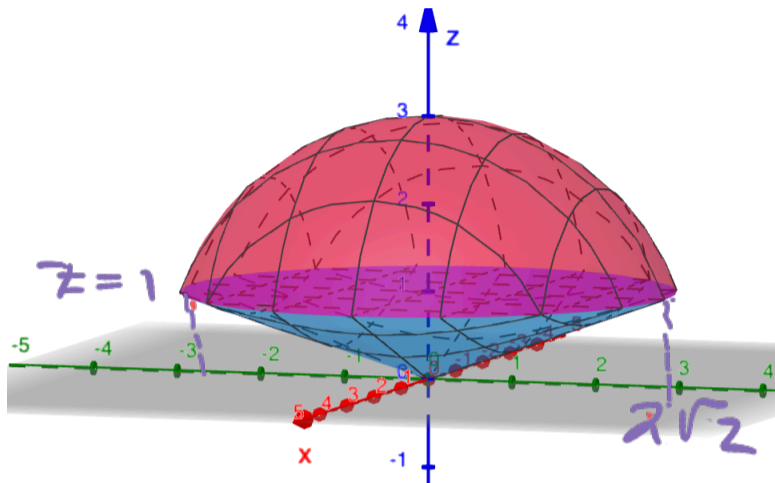# Quiz 15.7 and 8

SET UP BUT DO NOT EVALUATE: integrals as specified to find the volume enclosed above the cone $z = \sqrt{\frac{1}{8}(x^2 + y^2)}$ and inside the sphere $x^2 + y^2 + z^2 = 9$.
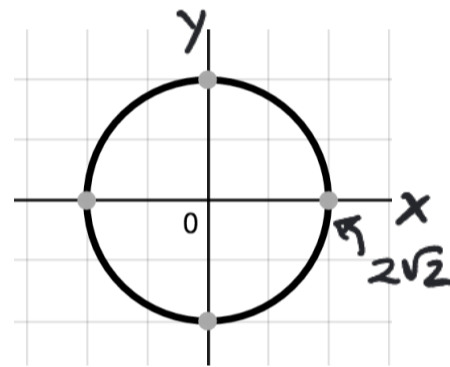
a) Sketch the solid

$z = 1$

$2\sqrt{2}$

Intersection:

$$\begin{cases} z = \sqrt{\frac{1}{8}(x^2 + y^2)} \\ x^2 + y^2 + z^2 = 9 \end{cases}$$

$x^2 + y^2 + \frac{1}{8}(x^2 + y^2) = 9$

$\quad \hookrightarrow 9(x^2 + y^2) = 72$

$\left.\begin{array}{l} x^2 + y^2 = 8 \\ z = 1 \end{array}\right\}$

$2\sqrt{2}$

b) Triple integral - cylindrical coordinates.

$$\int_{0}^{2\pi} \int_{0}^{2\sqrt{2}} \int_{\frac{r}{2\sqrt{2}}}^{\sqrt{9-r^2}} dz\, r\, dr\, d\theta$$

c) Triple integral - spherical coordinates.

$$\int_{0}^{2\pi} \int_{0}^{\tan^{-1}(2\sqrt{2})} \int_{0}^{3} \rho^2 \sin\phi \, d\rho \, d\phi \, d\theta$$

$2\sqrt{2}$

ϕ

3

convert cone to spherical

$\tan\phi = 2\sqrt{2}$