Rec 2:30 3:3,

1. Let c be the parabola joining $(-2,4)$ through $(0,0)$ to $(2,4)$ a portion of the parabola $y=x^2$.

Find $\int_c x^2 y\,dy$

Solution: $\int_c x^2 y\,dy = \int_{-2}^{2} x^2(x^2)\,2x\,dx = \int_{-2}^{2} 2x^5\,dx = 0$.

2. Consider the region bounded below by the cone $z^2=x^2+y^2$ and above by the sphere $x^2+y^2+z^2=20$.

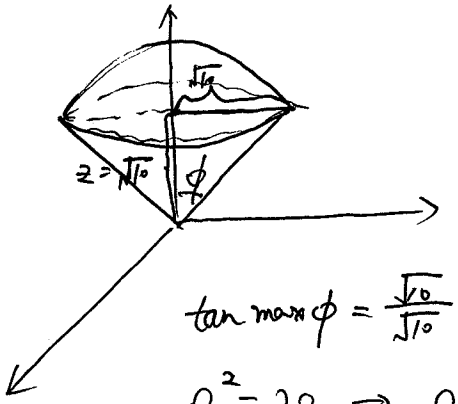
a) Where do these surfaces intersect?

b) set up a integral, including the limits which give this volume?

Solution:

a). $\begin{cases} x^2+y^2+z^2=20 \\ z^2=x^2+y^2 \end{cases} \Rightarrow \quad 2z^2=20 \Rightarrow z=\sqrt{10}$

b) $\iiint dV = \int_0^{2\pi}\int_0^{\frac{\pi}{4}}\int_0^{\sqrt{20}} \rho^2\sin\phi\,d\rho\,d\phi\,d\theta$



$\tan\max\phi = \frac{\sqrt{10}}{\sqrt{10}} = 1 \Rightarrow \max\phi = \frac{\pi}{4}$

$\rho^2=20 \Rightarrow \rho=\sqrt{20}$