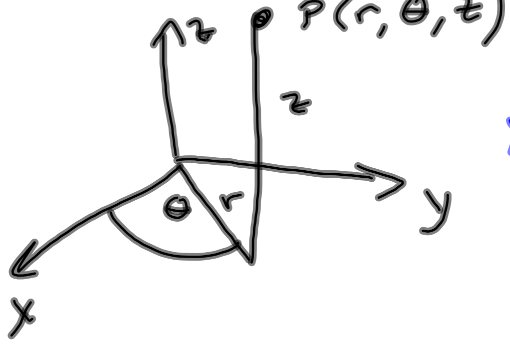
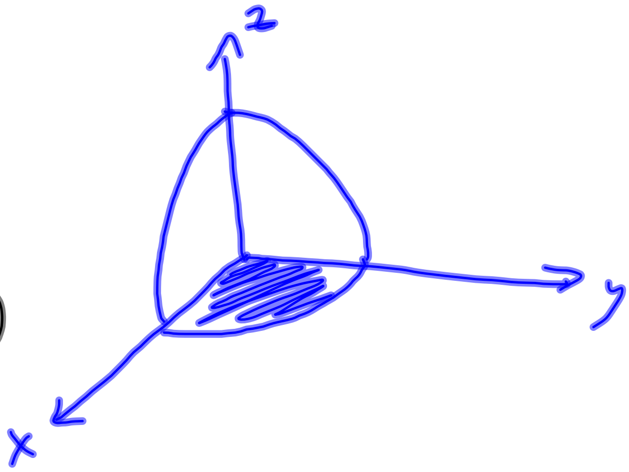
Σ §16.6 due Tuesday.

§16.7 .. Wed

E4 from §16.7

16.7

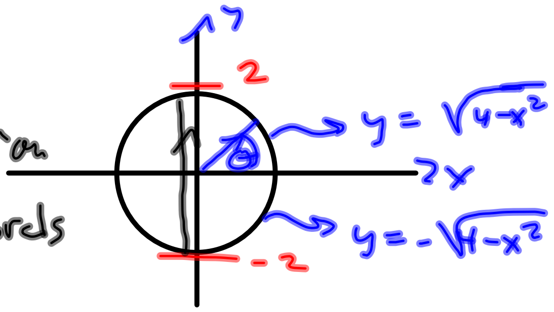




$$\int_{-2}^{2}\int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}}\int_{\sqrt{x^2+y^2}}^{2}(x^2+y^2)\,dz\,dy\,dx$$

The inner integral is a function $z=f(x,y)$ that's being integrated over a TYPE region

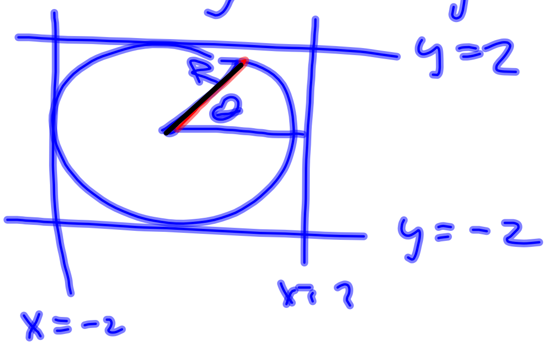
Make the conversion to cylindrical coords



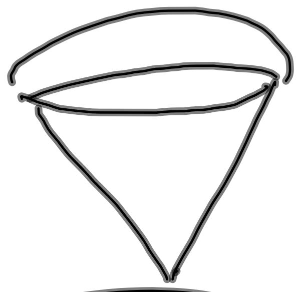
$x^2+y^2=r^2$

$$\int_{0}^{2\pi}\int_{0}^{2}\int_{z=r}^{z=2} r^2\cdot r\,dz\,dr\,d\theta$$

Trick is describing the region in polar coords:

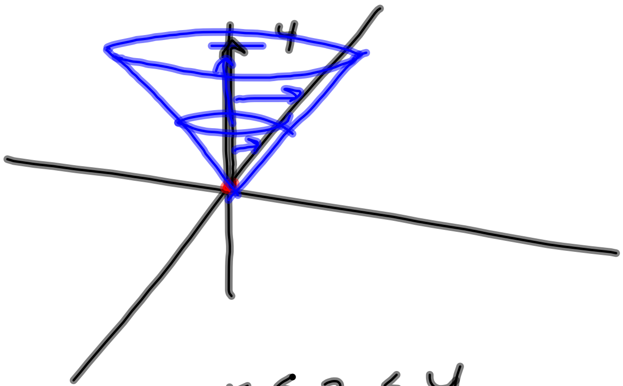


§ 16.7 Think cylinders where the projection onto the xy-plane is nice for polar coordinates.



16.7 #15

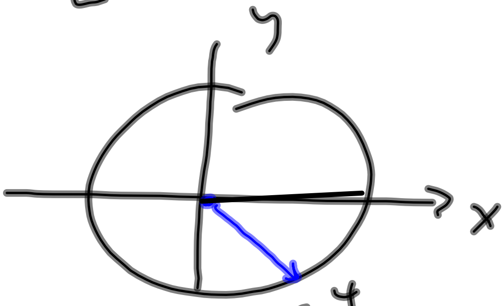
$$\int_0^4 \int_0^{2\pi} \left[\int_r^4 r\, dz \right] d\theta\, dr$$



$r \le z \le 4$

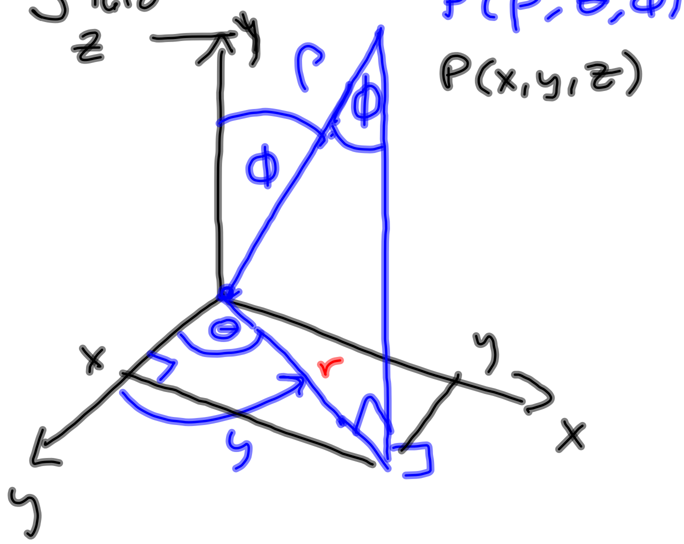
$0 \le \theta \le 2\pi$

$0 \le r \le 4$



$$\int \int \int_{\sqrt{x^2+y^2}}^{4} \sqrt{x+y^2} \quad dz$$

§ 16.8



$x = r\cos\theta$

$= \rho \sin\phi \cos\theta$

$\rho^2 = x^2 + y^2 + z^2$

$y = \underbrace{\rho \sin\phi}_{r} \underbrace{\sin\theta}_{\sin\theta}$

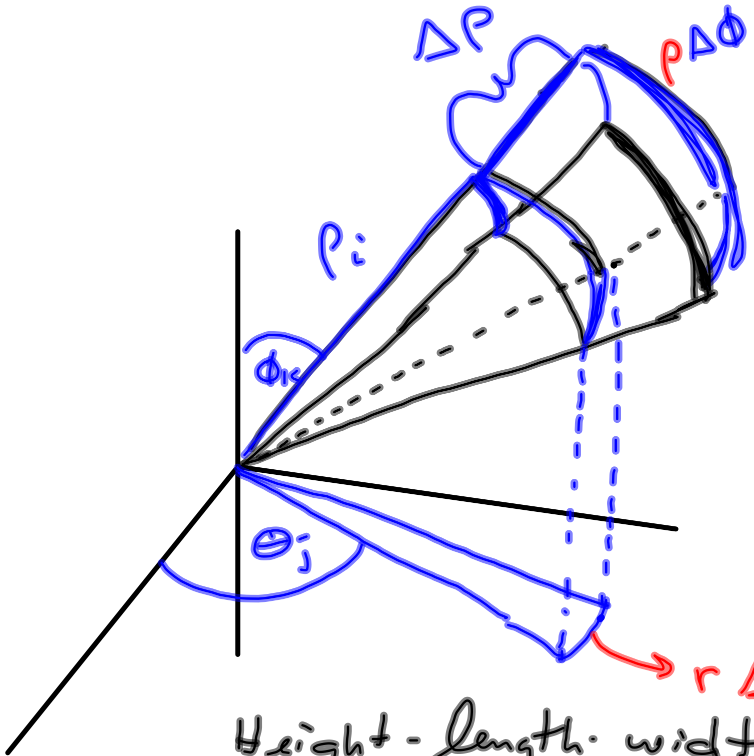


Fig 7
Attempt.

$r\Delta\theta = \rho\sin\phi\,\Delta\theta$

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