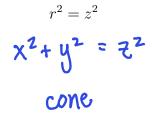
1. Set up a double integral (do not compute) in order to find the volume of the solid that is bounded by $z = x^2 + y^2$ and $z = 4 - x^2$. Show your work on how you got your bounds.

• plug in (x,y)=(0,0) to se $z = x^2 + y^2$ gives $z = 0 - z = 4 - x^2$ gives $z = 4 - z$	
dxdy	dydx
• 100k at intersection, solve for x: $x^{2} + y^{2} = 4 - x^{2}$ $4 2x^{2} = 4 - y^{2}$ $x^{2} = 2 - (\frac{y^{2}}{2})$ $x = \pm \sqrt{2 - (\frac{y^{2}}{2})}$	• look at intersection, solve for y: $x^{2}+y^{2} = 4 - x^{2}$ $y^{2} = 4 - 2x^{2}$ $y = \pm \sqrt{4 - 2x^{2}}$
• Now let $x=0$ to get y-bounds: $2x^2 = 4-y^2$ with $x=0$ gives $y^2 = 4$ $y = \pm 2$	• Now let $y=0$ to get x-bounds: $0 = 4 - 2x^{2}$ $2x^{2} = 4$ $x^{2} = 2$ $x = \pm \sqrt{2}^{2}$
$ \sum_{-2}^{2} \int_{-\sqrt{2} - (y^{2}/2)}^{\sqrt{2} - (y^{2}/2)} \frac{4 - 2x^{2} - y^{2}}{(4 - x^{2} - (x^{2} + y^{2}))} dx dy $ THERE IS A QUESTION	$\int_{-\sqrt{2}}^{\sqrt{2}} \int_{-\sqrt{4-2x^2}}^{\sqrt{4-2x^2}} \frac{4-2x^2-y^2}{y} \left[4-x^2-(x^2+y^2) \right] dy dx$

2.

(a) Identify the following surface given in cylindrical coordinates:



(b) Identify the following surface given in spherical coordinates:

$$\rho^{2} \sin^{2} \phi = 1$$

$$\chi^{2} + y^{2} = 1$$
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(c) Identify the following surface given in spherical coordinates:

$$\rho^{2} = 2\rho \cos \phi$$

$$X^{2} + y^{2} + Z^{2} = 2Z$$

$$X^{2} + y^{2} + Z^{2} - 2Z = 0$$

$$X^{2} + y^{2} + Z^{2} - 2Z + 1 = 1$$

$$X^{2} + y^{2} + (Z - 1)^{2} = 1$$
Sphere