Section 14.7 *Worksheet #28*

Triple Integrals in Cylindrical and Spherical Coordinates

Ex 1 (Ex 3 from Worksheet #27): Find the volume of the solid D bounded by $z = 3 - x^2 - y^2$, $z = -5 + x^2 + y^2$, $x \geq 0$, and $y \geq 0$.

Ex 2: Convert the following triple integral to cylindrical coordinates:

$$\int_{-2}^{2}\int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}}\int_{(x^2+y^2)^2}^{1} x^2\,dz\,dy\,dx.$$

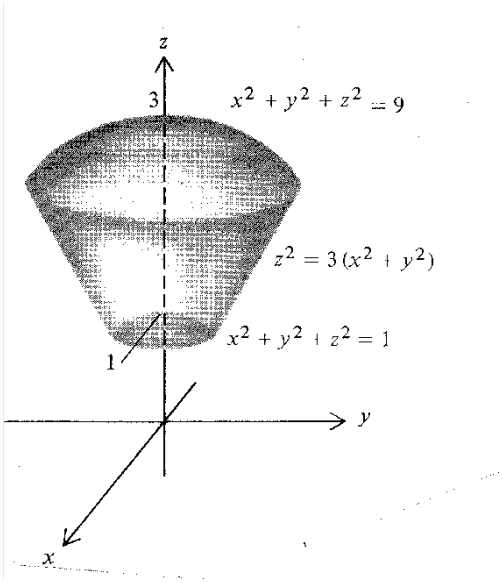
Recall: To represent the point (x, y, z) in spherical coordinates, use ...

Notes:

- To change from Rectangular to Polar/Cylindrical Integration, we introduce the conversion factor ...
- To change from Rectangular to Spherical Integration, we introduct the conversion factor ...
- Use spherical coordinates when integrating over ...
- Use cylindrical coordinates when integrating over ...

Ex 3: Evaluate $\displaystyle\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} \sqrt{x^2+y^2+z^2}\, dz\, dy\, dx$

Ex 4: Set up a triple integral that represents the volume of the solid D depicted.



Ex 5: Set up an integral that represents the volume of the solid D bounded above by $x^2 + y^2 + z^2 = 9$ and below by $z^2 = x^2 + y^2$.