the region \( R \) in \( \mathbb{R}^3 \) such that \( \{ (x,y,z) \mid y^2 + z^2 \leq \frac{1}{2} \} \) and above \( z = f(x,y) \). The volume \( V \) is

\[
V = \iiint_R f(x,y,z) \, dx \, dy \, dz
\]

Since

\[
\begin{align*}
\int_0^6 \left( \int_{y^2 + z^2 = \frac{1}{2}} \left( \int_0^{f(x,y)} \right) \, dx \right) \, dy &= \int_0^6 \left( \int_{y^2 + z^2 = \frac{1}{2}} \left( \int_0^{x^2y} \right) \, dx \right) \, dy \\
&= \int_0^6 \left( \int_{y^2 + z^2 = \frac{1}{2}} \left( \int_0^{x^2y} \right) \, dx \right) \, dy
\end{align*}
\]

---

*--- additional following to meaning of triple integrals

---

\( f(x,y) = 2 \)}
The diagram shows a projection of a 3D object onto the xy plane. The text seems to be discussing geometric properties, possibly involving coordinates and projections. However, the handwriting is not clear enough to transcribe accurately.
b) \[ \iiint_E f(x,y,z) \, dV = \iiint_R f(x,y,z) \, dx 
\begin{align*}
&\text{front face: } \\& \quad \int_0^1 \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} \sqrt{1-y^2} \\
&\text{back face: } \\& \quad \int_0^1 \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} \sqrt{1-y^2} \\
&\text{projection onto } yz \text{ plane: }
\end{align*} \]
\[ \int \int_{\Delta} dh \ dx \]

Explain why, as in the order \( dx \, dh \).

\[ 1 \leq z = \frac{h}{y} ; \ x = y ; \ y + z = 1 \]

\( x \geq 0 \) \( z \geq 0 \), \( x + y + z = 1 \)

(2) \( E \) is region bounded by planes
\[
\begin{align*}
1 & \leq y \leq 0 \\
2 & \leq x < 0 \\
3 & x \geq \frac{1-y}{2} \\
4 & 0 \leq z < 2 + h
\end{align*}
\]
For here $E$ and $F$ are face & E
\[ E = x = h \]
\[ E = \text{face of } E \]
\[ F = \text{front face of } E \]
\[ h \]
\[ 1 = h \]
\[ 2 \]
\[ 3 \]

\[ \int_{-1}^{1} dxdy \]
\[ \int_{-h}^{h} dxdy \]

\[ \text{deep in from below} \]
\[ \text{(add this inner year)} \]
\[ \text{deepen in from below} \]
\[ \text{and next let in orders} \]
\[ \text{to deepen in from below} \]

(9) Repeat, but now add the plane $x = \frac{1}{2}$
Here... need 2 integrals.
Find volume of intersection of cylinders.

\[ h = \frac{1}{2} \quad x = \frac{1}{2} \quad y = \frac{1}{2} \]

Sketch and cross-sectional sketch/adequate methods

\[ \int \frac{1}{2} dA \]

Problem to xy plane is:

\[ V = \iiint \frac{1}{2} \, dx \, dy \, dz \]
\[
\int_{x_1}^{x_2} f(x) \, dx = \int_{x_1}^{x_2} g(x) \, dx
\]

So by symmetry, get

\[
\int_{x_1}^{x_2} f(x) \, dx = \int_{x_1}^{x_2} g(x) \, dx
\]

...complete or useless sentence

Which is bigger?

What one type pattern future ever that?
\[
\begin{align*}
E &= \sqrt{y^2 - h^2} \\
&= \sqrt{8^2 - 2^2} \\
&= \sqrt{64 - 4} \\
&= \sqrt{60}
\end{align*}
\]

\( h \) is a test. 11
Center of Mass \( \bar{E} \): 

- \( E \) have formulas on curves \((x, y, z)\). 

\( f > 0 \) say. 

Us a density function on \( E \), mass \( \rho(E) \), where \( \rho \) is a 

Mass \( \rho(E) \), let's interpret 

\( \langle \text{Average Value} \rangle \) on \( E \). \( \langle \text{vec}(E) \rangle \). 

\( \langle \text{vec}(E) \rangle \). \( \langle \text{vec}(E) \rangle \). 

As with double integrals, may interpret: 

\[ \int_{E} \text{mass} \, \text{d}E \text{ represents} \]

As with double integrals, may interpret:

\[ \text{mass \, center of mass, average values} \]
\[ \mu \left( \bigcup_{\gamma \in \Gamma} \gamma(\partial \Omega) \right) = \bigcup_{\gamma \in \Gamma} \mu \gamma(\partial \Omega) \]
Cylindrical coordinates:

\[ r^2 = x^2 + y^2 \]

\[ \text{Cylindrical coordinates: } (r, \theta, z) \]

In space:

\[ (x, y, z) \]

\[ \begin{align*}
  x &= r \cos \theta \\
  y &= r \sin \theta \\
  z &= z
\end{align*} \]
\( z = c \) 
\( \Theta = c \) 
\( x = c \)
The page contains handwritten mathematical content and diagrams. It appears to be a series of steps or a problem-solving process, possibly related to calculus or geometry. The handwriting is not very legible, but the symbols and structures suggest a discussion or derivation.
The limits are just identifying the face.

\[
\begin{align*}
0 \leq z & \leq R^2 \\
0 \leq \rho & \leq R \\
0 \leq \phi & \leq \pi/2
\end{align*}
\]

Sketch solid with volume:

In spherical polar \( \rho \) to get outer limits, 

\[
\begin{align*}
\rho & \leq R \\
\phi & \leq \pi/2 \\
\theta & \leq \pi
\end{align*}
\]

May be easier to just think of projections.
Let \( L = \text{constant} \).

\[
L = \begin{cases}
0 & \text{if } \theta = 0 \\
1 & \text{if } \theta = \pi/2 \\
\cos \theta & \text{otherwise}
\end{cases}
\]

\[
\begin{align*}
1 &= \frac{1}{2} + \frac{1}{2} \\
0 &= \frac{1}{2} + 1 - \frac{1}{2} \\
x &= \frac{1}{2} \\
y &= \frac{1}{2} \\
z &= 0
\end{align*}
\]

\[
\begin{align*}
0 &= 2 \\
\Rightarrow
\end{align*}
\]

Calculate the volume bounded by cylinders \( \frac{x^2}{2} + \frac{y^2}{2} = 2 \times \), \( \frac{x^2}{2} + \frac{y^2}{2} = 2 \times \), \( \frac{x^2}{2} + \frac{y^2}{2} = 2 \times \).