

endpts curves surfaces

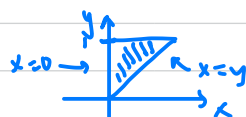
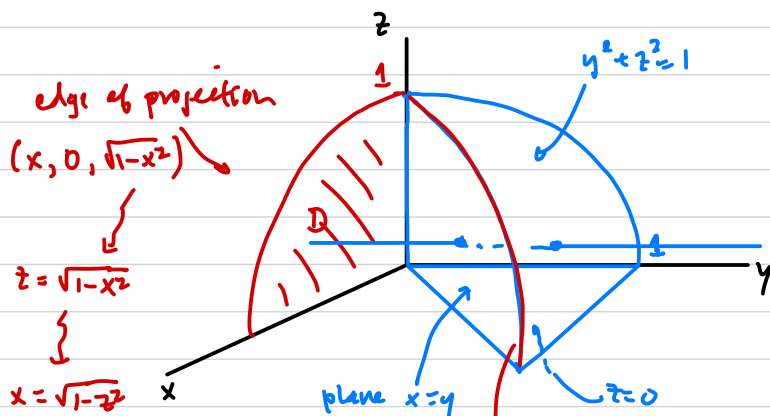
Ex Rewrite $\int_0^1 \int_0^y \int_0^{\sqrt{1-y^2}} f(x, y, z) dz dx dy$

as $\iiint f(x, y, z) dy dx dz$.

project onto xz-plane.

First: DRAW THE REGION

hint: start w/ outer two integrals.



upper surface cylinder
 $z = \sqrt{1-y^2}$
 $z^2 = 1-y^2$
 $\hookrightarrow y^2 + z^2 = 1$
 lower surface:
 $z = 0$
 $\hookrightarrow xy$ -plane

this curve defines shadow... parameterize it...

$\vec{r}(x) = (x, x, \sqrt{1-x^2})$

plane $x=y$
 $z = \sqrt{1-y^2}$

$\int_0^1 \int_0^{\sqrt{1-z^2}} \int_x^{\sqrt{1-z^2}} f(x, y, z) dy dx dz$

$= \int_0^1 \int_0^{\sqrt{1-z^2}} \int_0^y f(x, y, z) dx dy dz$

inner surface: $y = x$
 outer surface: $y^2 + z^2 = 1$