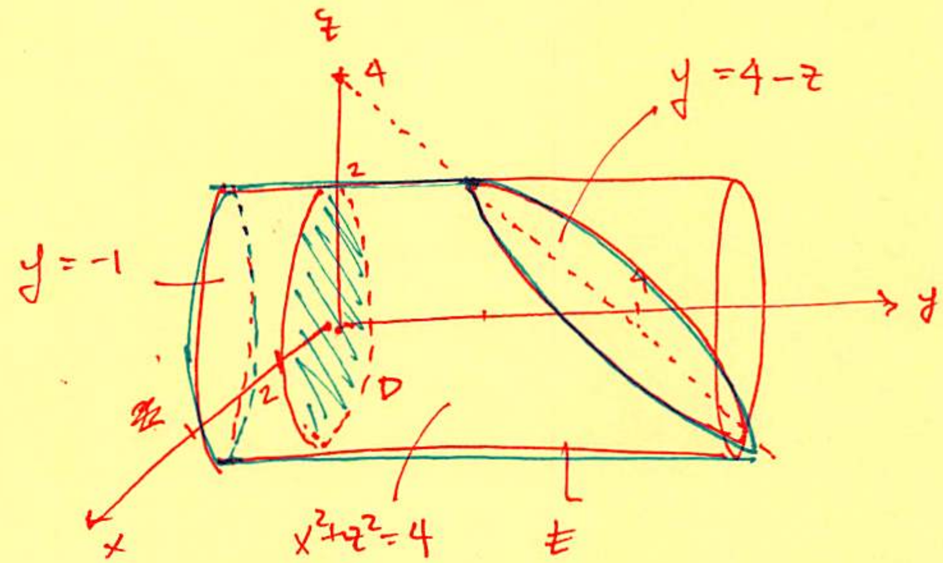
#22.



$$V(E) = \iiint_E 1 \cdot dV$$

$$= \iint_D \int_{-1}^{4-z} 1 \cdot dy \; dA$$

$$= \iint_D 4 - z - (-1) \; dA \quad = \iint_D 5 - z \; dA$$

$$= \int_0^{2\pi} \int_0^2 \left(5 - r\sin\theta\right) r \, dr \, d\theta$$

$$= \int_0^{2\pi} \frac{5}{2} r^2 - \frac{r^3}{3} \sin\theta \Big|_0^2 \, d\theta$$

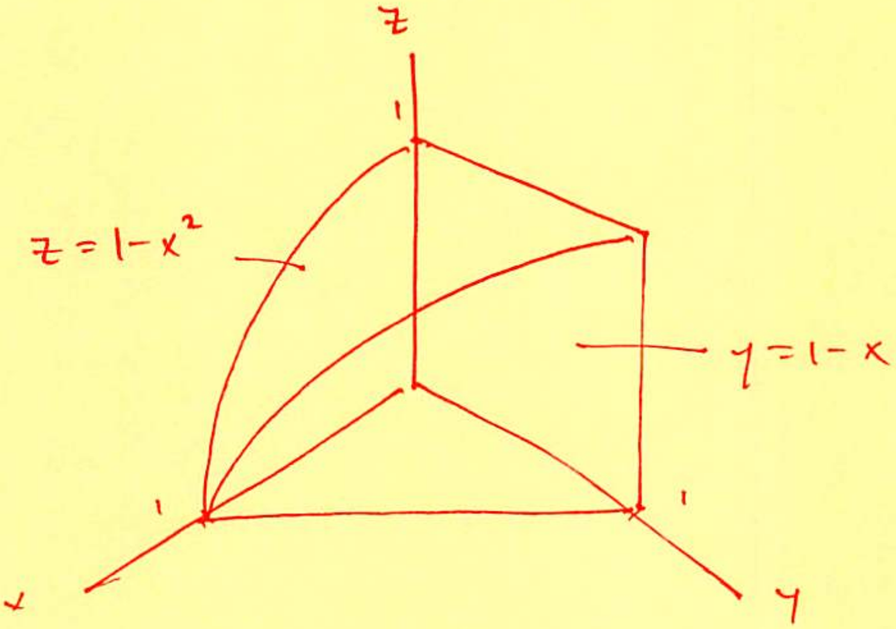
$$= \int_0^{2\pi} 10 - \frac{8}{3} \sin\theta \, d\theta$$

$$= 10\theta + \frac{8}{3} \cos\theta \Big|_0^{2\pi}$$

$$= 40\pi + \frac{8}{3} - \left(0 + \frac{8}{3}\right)$$

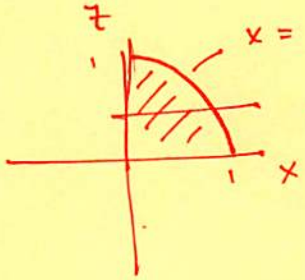
$$= 40\pi + \frac{8}{3}.$$

#34.



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

<u>dydxdz</u>:

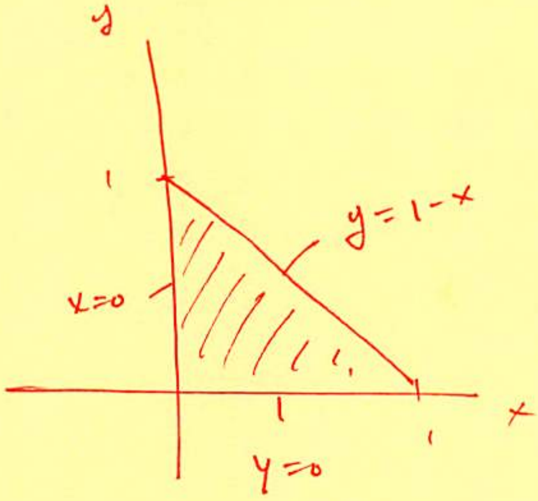


$x = \pm\sqrt{1-z}$

$= \pm\sqrt{-(z-1)}$

$x = \sqrt{1-z}$

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

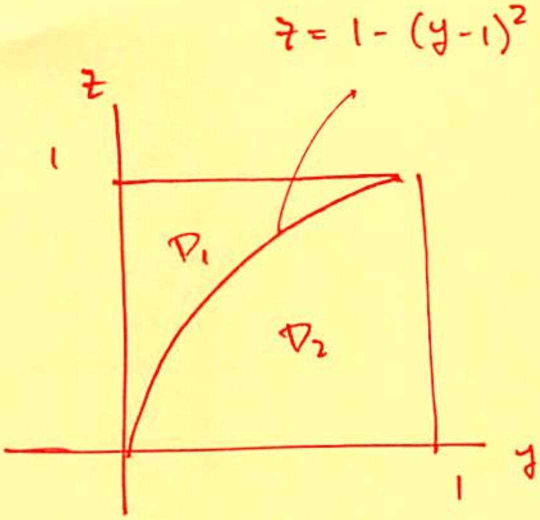


<u>dz dy dx</u> :

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

<u>dz dx dy</u>

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



$y = 1 - x^2 \quad \& \quad y = 1 - x$

$\Rightarrow z = 1 - (1-y)^2$

$= 1 - (y-1)^2$

$\Rightarrow y = 1 \pm \sqrt{1-z}$

$= 1 \pm \sqrt{-(z-1)}$

$\Rightarrow y = 1 - \sqrt{1-z}$

$z = 1 - x^2 \Rightarrow x^2 = -(z-1)$

$x = \pm\sqrt{-(z-1)}$

$\Rightarrow x = \sqrt{1-z}$

<u>dx dy dz :</u>

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

<u>dx dz dy :</u>

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