

Solutions to homework # 15 (Section 14.6)

#12. $V = \int_0^3 \int_0^{2x} \int_0^{9-x^2} dz dy dx$

#14 $V = \int_{-4}^4 \int_{-\sqrt{16-x^2}}^{\sqrt{16-x^2}} \int_0^{\sqrt{16-x^2-y^2}} dz dy dx$

16. $V = \int_{-\sqrt{2}}^{\sqrt{2}} \int_{-\sqrt{(4-2x^2)/3}}^{\sqrt{(4-2x^2)/3}} \int_{x^2+3y^2}^{4-x^2} dz dy dx$

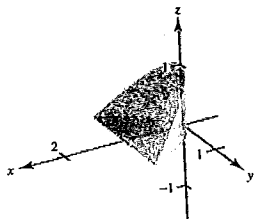
$$z = 4 - x^2 = x^2 + 3y^2$$

$$4 = 2x^2 + 3y^2$$

$$1 = \frac{x^2}{2} + \frac{y^2}{(4/3)} \text{ ellipse}$$

17. $V = \int_{-2}^2 \int_0^{4-y^2} \int_0^x dz dx dy = \int_{-2}^2 \int_0^{4-y^2} x dx dy$
 $= \frac{1}{2} \int_{-2}^2 (4 - y^2)^2 dy = \int_0^2 (16 - 8y^2 + y^4) dy = \left[16y - \frac{8}{3}y^3 + \frac{1}{5}y^5 \right]_0^2 = \frac{256}{15}$

26.



$$\int_{-1}^1 \int_0^{1-y^2} \int_y^{1-z} dx dz dy$$

30. Elliptic cone: $4x^2 + z^2 = y^2$

$$\int_0^4 \int_z^4 \int_0^{\sqrt{y^2-z^2}/2} dx dy dz$$

