

Problem 3 : Cylinder Coordinate

For the following region D, write the integral with cylinder coordinate on this region.

1. Problem 2.1

2. Problem 2.3

3. Problem 2.4

$$1. \int_{-2}^2 \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} \int_{x^2+y^2}^4 dz dy dx$$
$$= \int_0^{2\pi} \int_0^2 \int_{r^2}^4 r dz dr d\theta$$

$$2. \int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_0^5 dz dy dx$$
$$= \int_0^{2\pi} \int_0^1 \int_0^5 r dz dr d\theta$$

$$3. \int_0^a \int_0^{\sqrt{a^2-x^2}} \int_0^{x+y} dz dy dx$$
$$= \int_0^{\frac{\pi}{2}} \int_0^a \int_0^{r\cos\theta+r\sin\theta} r dz dr d\theta$$