Assignment 7

Due on 2023-10-14, 23:59 EST.

1. The volume cut off from the sphere $x^2 + y^2 + z^2 = a^2$ by the cylinder $x^2 + y^2 = 2b$ is

$V = \frac{4}{3} \pi a^2 \sqrt{a^2 - 4b^2}$

2. The volume of the region above the xy-plane bounded by the paraboloid $z = x^2 + y^2$ and the cylinder $x^2 + y^2 = a^2$ is

$V = \frac{1}{3} \pi a^3$ (Answer: $\frac{1}{3} \pi a^3$)

3. The volume of the solid bounded by the spheres $(x-1)^2 + (y-1)^2 + (z-1)^2 = 1$, $(x+1)^2 + (y+1)^2 + (z+1)^2 = 1$, and the plane $x+y+z=1$ is

$V = \frac{4}{3} \pi$ (Answer: $\frac{4}{3} \pi$)

4. The volume enclosed by the solid cut off from $x^2 + y^2 + z^2 = a^2$ and $x^2 + y^2 = a$ is

$V = \frac{4}{3} \pi a^3$ (Answer: $\frac{4}{3} \pi a^3$)

5. The volume of the region enclosed by the cylinder $x^2 + y^2 = a^2$ and the plane $z = b$ is

$V = \pi a^2 b$ (Answer: $\pi a^2 b$)

6. If $f(x, y, z) = x + y + z$, then $\int_{-1}^{1} \int_{-1}^{1} f(x, y) \, dx \, dy$ is

$V = 0$ (Answer: $0$)

7. The volume of the region enclosed by the cylinder $x^2 + y^2 = a^2$ and the plane $z = b$ is

$V = \pi a^2 b$ (Answer: $\pi a^2 b$)

8. The solid right prism has a right triangle as the base on the plane $x+y+z=1$, where $x$, $y$, and $z$ are constant, is

$V = \frac{1}{2} \cdot \text{base} \cdot \text{height}$ (Answer: $\frac{1}{2} \cdot \text{base} \cdot \text{height}$)

9. The volume of the region enclosed by the cylinder $x^2 + y^2 = a^2$ and the plane $z = b$ is

$V = \pi a^2 b$ (Answer: $\pi a^2 b$)

10. The volume of the region enclosed by the cylinder $x^2 + y^2 = a^2$ and the plane $z = b$ is

$V = \pi a^2 b$ (Answer: $\pi a^2 b$)

11. The volume of the region enclosed by the cylinder $x^2 + y^2 = a^2$ and the plane $z = b$ is

$V = \pi a^2 b$ (Answer: $\pi a^2 b$)

12. The volume of the region enclosed by the cylinder $x^2 + y^2 = a^2$ and the plane $z = b$ is

$V = \pi a^2 b$ (Answer: $\pi a^2 b$)