Homework: Lesson 21- Section 16.4 - Triple Integrals

Save

Score: 0 of 1 pt

HW Score: 68.18%, 7.5 of 11 pts

*14.5.5

Question Help

Let D be the region bounded by the paraboloids $z = 16 - x^2 - y^2$ and $z = x^2 + y^2$. Write six different triple iterated integrals for the volume of D. Evaluate one of the integrals.

Find the volume by integrating, using the order dz dy dx. Choose the correct choice below.

- A. $\displaystyle\int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{-\sqrt{8-x^2}}^{\sqrt{8-x^2}}\int_{x^2+y^2}^{16-x^2-y^2} dz\,dy\,dx$
- B. $\displaystyle\int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{x}^{\sqrt{16-x^2}}\int_{-\sqrt{8-x^2}}^{\sqrt{8-x^2}} dz\,dy\,dx$
- C. $\displaystyle\int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{-\sqrt{8-x^2}}^{\sqrt{8-x^2}}\int_{16-x^2-y^2}^{8} dz\,dy\,dx + \int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{-\sqrt{8-x^2}}^{\sqrt{8-x^2}}\int_{8}^{x^2+y^2} dz\,dy\,dx$
- D. $\displaystyle\int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{\sqrt{16-x^2}}^{8}\int_{\sqrt{8-x^2-y^2}}^{\sqrt{8-x^2-y^2}} dz\,dy\,dx + \int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{8}^{x}\int_{-\sqrt{8-x^2-y^2}}^{\sqrt{8-x^2-y^2}} dz\,dy\,dx$

6 2

$16 - x^2 - y^2 = x^2 + y^2$

$16 = 2x^2 + y^2$

$x^2 + y^2 = 8$

$y = \pm\sqrt{8 - \cancel{y^2}\ x^2}\ )$

same thing for part (b)

Click to select your answer and then click Check Answer.

6 parts remaining

Clear All

Check Answer

Homework: Lesson 21- Section 16.4 - Triple Integrals

Save

Score: 0 of 1 pt

HW Score: 68.18%, 7.5 of 11 pts

*14.5.5

① ②

Question Help

Let D be the region bounded by the paraboloids $z = 16 - x^2 - y^2$ and $z = x^2 + y^2$. Write six different triple iterated integrals for the volume of D. Evaluate one of the integrals.

B. $\int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{-\sqrt{8-y^2}}^{\sqrt{8-y^2}}\int_{16-x^2-y^2}^{8} dz\,dx\,dy + \int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{-\sqrt{8-y^2}}^{\sqrt{8-y^2}}\int_{8}^{x^2+y^2} dz\,dx\,dy$

C. $\int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{y}^{\sqrt{16-y^2}}\int_{-\sqrt{8-x^2-y^2}}^{\sqrt{8-x^2-y^2}} dz\,dx\,dy$

D. $\int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{-\sqrt{8-y^2}}^{\sqrt{8-y^2}}\int_{x^2+y^2}^{16-x^2-y^2} dz\,dx\,dy$

Find the volume by integrating, using the order dx dz dy. Choose the correct choice below.

A. $\int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{8}^{16-y^2}\int_{-\sqrt{16-z-y^2}}^{\sqrt{16-z-y^2}} dx\,dz\,dy + \int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{y^2}^{8}\int_{-\sqrt{z-y^2}}^{\sqrt{z-y^2}} dx\,dz\,dy$

B. $\int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{-\sqrt{16-y^2}}^{\sqrt{16-y^2}}\int_{8}^{8-y^2} dx\,dz\,dy + \int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{-\sqrt{y}}^{\sqrt{y}}\int_{x^2+y^2}^{8} dx\,dz\,dy$

C. $\int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{-\sqrt{8-y^2}}^{\sqrt{8-y^2}}\int_{\sqrt{z-y^2}}^{\sqrt{16-z-y^2}} dx\,dz\,dy$

D. $\int_{-2\sqrt{2}}^{2\sqrt{2}}\int_{y^2}^{16-y^2}\int_{-\sqrt{16-z-y^2}}^{\sqrt{16-z-y^2}} dx\,dz\,dy$

eq ①

eq ②

$z - y^2 - 16 = -x^2$ and $z = 16 - y^2$

$x^2 = 16 - y^2 - z$

$x = \pm\sqrt{16 - y^2 - z}$.

for part (d)

$y = \sqrt{16 - z}$

but

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

hence use two integrals

Click to select your answer and then click Check Answer.

4 parts remaining

Clear All

Whiteboard Fullscreen snip

Homework: Lesson 21- Section 16.4 - Triple Integrals

Save

Score: 0 of 1 pt | 11 of 11 (8 complete) | **HW Score:** 68.18%, 7.5 of 11 pts

*14.5.5

Question Help

Let D be the region bounded by the paraboloids $z = 16 - x^2 - y^2$ and $z = x^2 + y^2$. Write six different triple iterated integrals for the volume of D. Evaluate one of the integrals.

B. $\displaystyle\int_{-2\sqrt{2}}^{2\sqrt{2}} \int_{-\sqrt{8-z}}^{\sqrt{8-z}} \int_{\sqrt{z-y^2}}^{\sqrt{16-z-y^2}} dx\,dy\,dz$

C. $\displaystyle\int_{8}^{16} \int_{-\sqrt{16-z}}^{\sqrt{16-z}} \int_{-\sqrt{16-z-y^2}}^{\sqrt{16-z-y^2}} dx\,dy\,dz + \int_{0}^{8} \int_{-\sqrt{z}}^{\sqrt{z}} \int_{-\sqrt{z-y^2}}^{\sqrt{z-y^2}} dx\,dy\,dz$

D. $\displaystyle\int_{-2\sqrt{2}}^{2\sqrt{2}} \int_{8}^{16-z} \int_{-\sqrt{16-z-y^2}}^{\sqrt{16-z-y^2}} dx\,dy\,dz + \int_{-2\sqrt{2}}^{2\sqrt{2}} \int_{z}^{8} \int_{-\sqrt{z-y^2}}^{\sqrt{z-y^2}} dx\,dy\,dz$

Find the volume by integrating, using the order dy dz dx. Choose the correct choice below.

A. $\displaystyle\int_{-2\sqrt{2}}^{2\sqrt{2}} \int_{-\sqrt{16-x^2}}^{\sqrt{16-x^2}} \int_{8}^{8-x^2} dy\,dz\,dx + \int_{-2\sqrt{2}}^{2\sqrt{2}} \int_{-\sqrt{x}}^{\sqrt{x}} \int_{x^2+y^2}^{8} dy\,dz\,dx$

B. $\displaystyle\int_{-2\sqrt{2}}^{2\sqrt{2}} \int_{-\sqrt{8-x^2}}^{\sqrt{8-x^2}} \int_{\sqrt{z-x^2}}^{\sqrt{16-z-x^2}} dy\,dz\,dx$

C. $\displaystyle\int_{-2\sqrt{2}}^{2\sqrt{2}} \int_{x^2}^{16-x^2} \int_{-\sqrt{16-z-x^2}}^{\sqrt{16-z-x^2}} dy\,dz\,dx$

D. $\displaystyle\int_{-2\sqrt{2}}^{2\sqrt{2}} \int_{8}^{16-x^2} \int_{-\sqrt{16-z-x^2}}^{\sqrt{16-z-x^2}} dy\,dz\,dx + \int_{-2\sqrt{2}}^{2\sqrt{2}} \int_{x^2}^{8} \int_{-\sqrt{z-x^2}}^{\sqrt{z-x^2}} dy\,dz\,dx$

$y^2 = 16 - x^2 - 2$

$y = \sqrt{16 - x^2 - 2}$

and

$y = \sqrt{2 - x^2}$

for part f

$2 = 16 - x^2$

$x = \sqrt{16 - 2}$

Click to select your answer and then click Check Answer.

2 parts remaining

Clear All

Check Answer

temp

15 October 2019 19:11

$$\int_{-2\sqrt{2}}^{2\sqrt{2}} \int_{-\sqrt{8-x^2}}^{\sqrt{8-x^2}} \int_{x^2+y^2}^{16-x^2-y^2} dz\, dy\, dx$$

$$\int_{-2\sqrt{2}}^{2\sqrt{2}} \int_{-\sqrt{8-x^2}}^{\sqrt{8-x^2}} (16 - 2x^2 - 2y^2)\, d$$

$$\int_{-2\sqrt{2}}^{2\sqrt{2}} \left[16y - 2x^2y - \frac{2y^3}{3} \right]$$

$$2y(8 - x^2)$$

$$\int_{-2\sqrt{2}}^{2\sqrt{2}} \left[2(8-x^2)^{3/2} + \frac{2(8-}{3} \right.$$

$2\sqrt{2}$

$$\int_{-2\sqrt{2}}^{2\sqrt{2}} \frac{\cancel{8}}{3}\left(8-x^2\right)^{3/2} dx$$

$$= \frac{16}{3}\int_{0}^{2\sqrt{2}} \left(8-x^2\right)^{3/2} dx .$$

Let $x = 2\sqrt{2}\sin\theta$. Then $dx = 2\sqrt{2}\cos$

$$\frac{16}{3} \cdot 2\sqrt{2}\int_{0}^{\pi/2} \left(8-8\sin^2\theta\right)^{3/2} \cdot \cos\theta$$

$$(8^{1/2}\times$$

$$= \frac{8 \cdot 8^{3/2}}{3}\int_{0}^{\pi/2} \cos^4\theta \, d\theta$$

$$\left(\frac{\cos 2\theta + 1}{2}\right)^2 = \cos$$

$$= \frac{8 \cdot 64}{3}\int_{0}^{\pi/2} \left(\frac{\cos 2\theta + 1}{2}\right)^2 d\theta$$

$$3 \int_0 \left(\quad 2 \quad \right)$$

$$\frac{2\cdot 8\cdot \cancel{64}^{16}}{3\cdot \cancel{4}} \int_0^{\pi/2} \left(\cos^2 2\theta + 2\cos 2\theta + 1\right)$$

$$\frac{2\cdot 128}{3} \int_0^{\pi/2} \left[\frac{\cos 4\theta + 1}{2}\right] + 2\cos 2\theta$$

$$\frac{2\cdot 128}{3} \int_0^{\pi/2} \frac{1}{2}\left[\frac{1}{4}\sin 4\theta + \theta\right] + \sin + \theta$$

$$\frac{2\cdot 128}{3} \left\{ \frac{1}{2}\left[\frac{1}{4}\cdot 0 + \frac{\pi}{2}\right] + \frac{\pi}{2} \right\}$$

$$\frac{2\cdot 128}{3} \left[\frac{\pi}{4} + \frac{\pi}{2} \right] \qquad \frac{128}{3}\left(\frac{3\pi}{4}\right)$$

64π