

# Classroom Voting Questions: Multivariable Calculus

## 16.3 Triple Integrals

1. Which of the following is the mass of the solid defined by  $0 \leq x \leq 2$ ,  $0 \leq y \leq 3$ , and  $0 \leq z \leq 4$  with density function  $\delta(x, y, z) = x + y$ ?

(a)  $\int_0^2 \int_0^4 \int_0^3 1 dydzdx$

(b)  $\int_0^2 \int_0^4 \int_0^3 (x + y) dydx dz$

(c)  $\int_0^2 \int_0^4 \int_0^3 (x + y) dx dz dy$

(d)  $\int_0^2 \int_0^4 \int_0^3 (x + y) dy dz dx$

2. The region of integration for the integral  $\int_{-r}^r \int_{-\sqrt{r^2-x^2}}^{\sqrt{r^2-x^2}} \int_0^{10} f(x, y, z) dz dy dx$  is a

(a) sphere

(b) cylinder

(c) cone

(d) none of the above

3. What does the integral  $\int_0^1 \int_0^1 \int_0^1 z dz dy dx$  represent?

(a) The volume of a cube of side 1

(b) The volume of a sphere of radius 1

(c) The area of a square of side 1

(d) None of the above

4. Which of the following integrals is equal to  $\int_0^3 \int_0^2 \int_0^y f(x, y, z) dz dy dx$ ?

(a)  $\int_0^2 \int_0^3 \int_0^y f(x, y, z) dz dx dy$

(b)  $\int_0^2 \int_0^3 \int_0^y f(x, y, z) dz dy dx$

(c)  $\int_0^3 \int_0^2 \int_0^y f(x, y, z) dx dy dz$

(d)  $\int_0^3 \int_0^2 \int_0^z f(x, y, z) dy dz dx$

5.  $\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_{-\sqrt{1-x^2-y^2}}^{\sqrt{1-x^2-y^2}} (x^2 + y^2 + z^2) dz dy dx$  describes the mass of

- (a) a cone that gets heavier toward the outside.
- (b) a cone that gets lighter toward the outside.
- (c) a ball that gets heavier toward the outside.
- (d) a ball that gets lighter toward the outside.

6. Which of the following integrals does not make sense?

- (a)  $\int_1^3 \int_{y-1}^2 \int_0^y f(x, y, z) dz dx dy$
- (b)  $\int_1^3 \int_0^y \int_2^{y-1} f(x, y, z) dx dy dz$
- (c)  $\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} f(x, y, z) dz dy dx$
- (d)  $\int_{-1}^1 \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} \int_0^{\sqrt{1-x^2-y^2}} f(x, y, z) dz dx dy$