Classroom Voting Questions: Multivariable Calculus

16.2 Iterated Integrals

1. The integral $\int_0^1 \int_0^1 x^2 dxdy$ represents the

   (a) Area under the curve $y = x^2$ between $x = 0$ and $x = 1$.

   (b) Volume under the surface $z = x^2$ above the square $0 \leq x, y \leq 1$ on the xy-plane.

   (c) Area under the curve $y = x^2$ above the square $0 \leq x, y \leq 1$ on the xy-plane.

2. The integral $\int_0^1 \int_x^1 dydx$ represents the

   (a) Area of a triangular region in the xy-plane.

   (b) Volume under the plane $z = 1$ above a triangular region of the plane.

   (c) Area of a square in the xy-plane.

3. Let $f(x, y)$ be a positive function. Rank the following integrals from smallest to largest.

$$I_1 = \int_0^1 \int_{x^2}^1 f(x, y)dydx \qquad I_2 = \int_0^1 \int_{x^3}^1 f(x, y)dydx \qquad I_3 = \int_0^1 \int_0^1 f(x, y)dydx$$

   (a) $I_1 < I_2 < I_3$

   (b) $I_1 < I_3 < I_2$

   (c) $I_2 < I_1 < I_3$

   (d) $I_2 < I_3 < I_1$

   (e) $I_3 < I_2 < I_1$

   (f) $I_3 < I_1 < I_2$

4. $\int_0^1 \int_0^{2-2x} f(x, y)dydx$ is an integral over which region?

   (a) The triangle with vertices (0,0), (2,0), (0,1).

   (b) The triangle with vertices (0,0), (0,2), (1,0).

   (c) The triangle with vertices (0,0), (2,0), (2,1).

   (d) The triangle with vertices (0,0), (1,0), (1,2).

5. $\int_0^1 \int_{2y}^2 f(x,y)dxdy$ is an integral over which region?

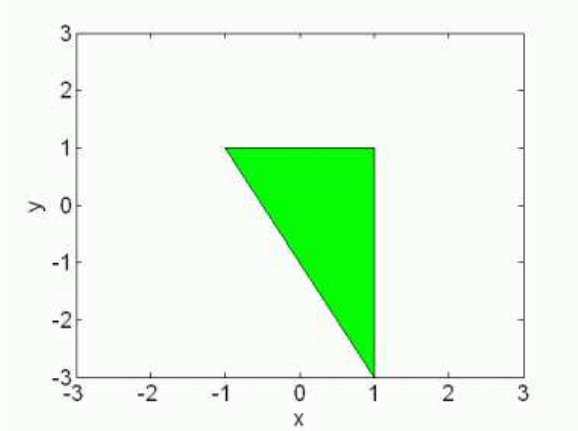
   (a) The triangle with vertices (0,0), (2,0), (0,1).

   (b) The triangle with vertices (0,0), (0,2), (1,0).

   (c) The triangle with vertices (0,0), (2,0), (2,1).

   (d) The triangle with vertices (0,0), (1,0), (1,2).

6. Which of the following integrals has the proper limits to integrate the shaded region below?



   (a) $\int_{-1}^1 \int_{-3}^{-2x-1} f(x,y)dydx$

   (b) $\int_{-3}^1 \int_{-\frac{1}{2}y-\frac{1}{2}}^1 f(x,y)dxdy$

   (c) $\int_{-1}^1 \int_{-\frac{1}{2}x-1}^1 f(x,y)dydx$

   (d) $\int_{-3}^1 \int_{-1}^{-\frac{1}{2}y-\frac{1}{2}} f(x,y)dxdy$

   (e) None of the above

7. Which of the following integrals is equal to $\int_0^3 \int_0^{4x} f(x,y)dydx$?

   (a) $\int_0^{4x} \int_0^3 f(x,y)dxdy$

   (b) $\int_0^{12} \int_{y/4}^3 f(x,y)dxdy$

   (c) $\int_0^{12} \int_3^{y/4} f(x,y)dxdy$

   (d) $\int_0^{12} \int_0^{y/4} f(x,y)dxdy$

   (e) $\int_0^3 \int_0^{4x} f(x,y)dxdy$

8. The region of integration in the integral $\int_0^2 \int_0^{2x} f(x,y)dydx$ is a

   (a) rectangle
   (b) triangle with width 2 and height 4
   (c) triangle with width 4 and height 2
   (d) none of the above

9. The value of $\int_{-r}^{r} \int_{-\sqrt{r^2-x^2}}^{\sqrt{r^2-x^2}} xdydx$ is

   (a) πr
   (b) $\pi/2$
   (c) πr^2
   (d) 0