Double Integrals over General Regions Practice Problems

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1. Evaluate $\iint_D 42y^2 - 12x\,dA$ where $D = \left\{(x,y)\,|0 \le x \le 4, (x-2)^2 \le y \le 6\right\}$

2. Evaluate $\iint_D 2yx^2 + 9y^3\,dA$ where D is the region bounded by $y = \frac{2}{3}x$ and $y = 2\sqrt{x}$.

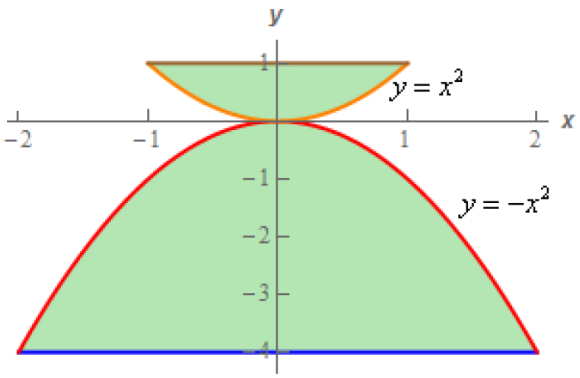
3. Evaluate $\iint_D (10x^2y^3 - 6)\,dA$ where D is the region bounded by $x = -2y^2$ and $x = y^3$.

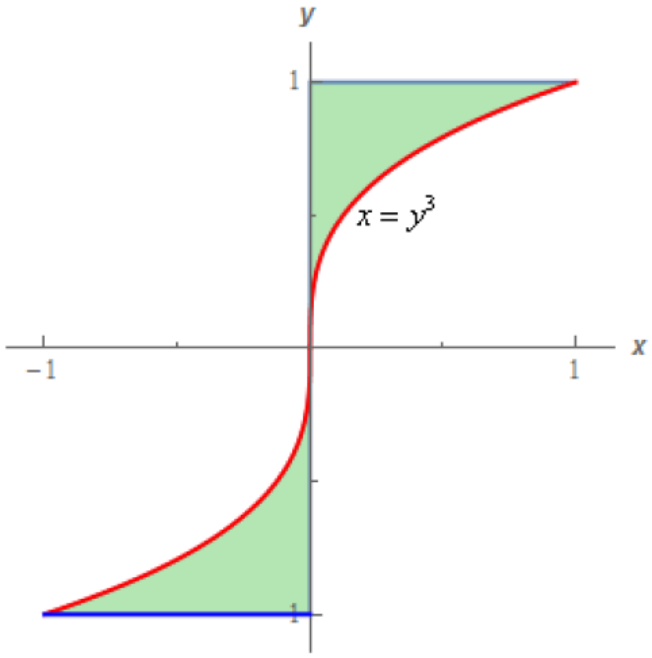
4. Evaluate $\iint_D x\,(y-1)\,dA$ where D is the region bounded by $y = 1 - x^2$ and $y = x^2 - 3$.

5. Evaluate $\iint_D 5x^3\cos\left(y^3\right)\,dA$ where D is the region bounded by $y = 2, y = \frac{1}{4}x^2$ and the y-axis.

6. Evaluate $\iint_D \frac{1}{y^{\frac{1}{3}}\,(x^3+1)}\,dA$ where D is the region bounded by $x = -y^{\frac{1}{3}}, x = 3$ and the x-axis.

7. Evaluate $\iint_D 3 - 6xy\,dA$ where D is the region shown below.





8. Evaluate $\iint_D e^{y^4}\, dA$ where D is the region shown below.

9. Evaluate $\iint_D 7x^2 + 14y\, dA$ where D is the region bounded by $x = 2y^2$ and $x = 8$ in the order given below. Integrate with respect to x first and then y. Integrate with respect to y first and then x.

10. For problems 10 & 11 evaluate the given integral by first reversing the order of integration.

$$\int_0^3 \int_{2x}^6 \sqrt{y^2 + 2}\, dy\, dx$$

11. $$\int_0^1 \int_{-\sqrt{y}}^{y^2} 6x - y\, dx\, dy$$

12. Use a double integral to determine the area of the region bounded by $y = 1 - x^2$ and $y = x^2 - 3$.

13. Use a double integral to determine the volume of the region that is between the xy-plane and $f(x, y = 2 + \cos(x^2)$ and is above the triangle with vertices $(0, 0), (6, 0)$ and $(6, 2)$.

14. Use a double integral to determine the volume of the region bounded by $z = 6 - 5x^2$ and the planes $y = 2x, y = 2, x = 0$ and the xy-plane.

15. Use a double integral to determine the volume of the region formed by the intersection of the two cylinders $x^2 + y^2 = 4$ and $x^2 + z^2 = 4$.