Homework 1

- Homework 1 is due January 10 in class.
- Exercises are taken from J. Rogawski, C. Adams, R. Franzosa *Calculus, Multivariable*, 4th Ed., W. H. Freeman & Company.

16.1 Integration in Two Variables

Exercises

1. Compute the Riemann sum $S_{4,3}$ to estimate the double integral of $f(x,y) = xy$ over $\mathcal{R} = [1,3] \times [1,2.5]$. Use the regular partition and upper-right vertices of the subrectangles as sample points.

8. Evaluate $\iint_{\mathcal{R}} 4 \, \mathrm{d}A$, where $\mathcal{R} = [2,5] \times [4,7]$.

9. Evaluate $\iint_{\mathcal{R}} (15 - 3x) \, \mathrm{d}A$, where $\mathcal{R} = [0,5] \times [0,3]$, and sketch the corresponding solid region (see Example 2).

16. Use symmetry to evaluate the integral $\iint_{\mathcal{R}} (1 - x) \, \mathrm{d}A$, where $\mathcal{R} = [0,2] \times [-7,7]$.

17. Use symmetry to evaluate the integral $\iint_{\mathcal{R}} \sin x \, \mathrm{d}A$, where $\mathcal{R} = [0,2\pi] \times [0,2\pi]$.

19. Evaluate the iterated integral $\int_1^3 \int_0^2 x^3 y \, \mathrm{d}y \mathrm{d}x$.

23. Evaluate the iterated integral $\int_{-1}^1 \int_0^\pi x^2 \sin y \, \mathrm{d}y \mathrm{d}x$.

31. Evaluate the iterated integral $\int_1^2 \int_0^4 \frac{\mathrm{d}y \mathrm{d}x}{x+y}$.

40. Evaluate the integral $\iint_{\mathcal{R}} \frac{y}{x+1} \, \mathrm{d}A$, where $\mathcal{R} = [0,2] \times [0,4]$.

42. Evaluate the integral $\iint_{\mathcal{R}} e^{3x+4y} \, \mathrm{d}A$, where $\mathcal{R} = [0,1] \times [1,2]$.

49. **(a)** Which is easier, antidifferentiating $\frac{y}{1+xy}$ with respect to x or with respect to y? Explain.

(b) Evaluate $\iint_{\mathcal{R}} \frac{y}{1+xy} \, \mathrm{d}A$, where $\mathcal{R} = [0,1] \times [0,1]$.