15.2 Iterated Integrals

1. Evaluate the following

   (a) $\int_1^4 \int_0^2 (6x^2y - 2x)\ dy\ dx$

   (b) $\int_0^1 \int_0^1\ v(u+v^2)^4\ du\ dv$

   (c) $\int_1^4 \int_1^2 \left(\frac{x}{y} + \frac{y}{x}\right)\ dy\ dx$

   (d) $\iint_R ye^{-xy}\ dA$, where $R = [0,2] \times [0,3]$

2. If $\int_0^1 f(x,y)\ dy = 4x$ evaluate

$$\int_0^1 \int_2^3 x^2 f(x,y)\ dx\ dy$$

3. Find the volume of the solid that lies under the plane $4x + 6y - 2z + 15 = 0$ and above the rectangle $R = \{(x,y) \mid -1 \leq x \leq 2, -1 \leq y \leq 1\}$.

4. Find the volume of the solid in the first octant bounded by the cylinder $z = 16 - x^2$ and the plane $y = 5$.

5. Find the average value of $f(x,y) = x^2 y$ over the rectangle with vertices $(-1,0), (-1,5), (1,5), (1,0)$.