Problems from the book:

Section 5.4: 1ac, 2ad, 5.

Section 5.5: 1, 3, 16.

Additional Problems

A1. Sketch the region of integration and compute the integral $\iint_R 2xy\,dx\,dy$ where R is the region defined by the inequalities $x \geq 0$, $y \geq x^2$, and $y \leq 9 - x^2$.

A2. Sketch the region of integration and determine the limits of integration for computing $\iiint_R xyz\; dV$ over the region R bounded by the planes $x = 0$, $y = 0$, $z = 0$, $x + y = 4$, and $z - x - y = 1$. You do not have to compute the value of the integral.

A3. Let R be the region bounded by the paraboloid $z = x^2 + y^2$ and the plane $z = 2y$. Write down triple integrals in the order $dz\,dx\,dy$ and $dz\,dy\,dx$ that compute the volume of R. Do not evaluate these integrals.

A4. Evaluate $\displaystyle\int_1^e \int_1^e \int_1^e \frac{1}{xyz}\,dx\,dy\,dz$.

A5. (a) Sketch the region of integration for the integral $\displaystyle\int_0^1 \int_{-1}^0 \int_0^{y^2} dz\,dy\,dx$.

(b) Rewrite the integral as an integral in the other five orders: $dy\,dz\,dx$, $dy\,dx\,dz$, $dx\,dy\,dz$, $dx\,dz\,dy$, and $dz\,dx\,dy$

A6. Compute $\iiint_R x\,dV$ where R is the region in the first octant bounded by the coordinate planes, the plane $y + z = 2$, and the parabolic cylinder $x = 4 - y^2$.

A7. Evaluate the following integral by changing the order of integration in an appropriate way:

$$\int_0^4 \int_0^1 \int_{2y}^2 \frac{4\cos(x^2)}{2\sqrt{z}}\,dx\,dy\,dz$$