Triple Integrals

Problem 1 (Stewart, Exercise 15.6.29)**.** *Express the integral* $\iiint_E f(x,y,z)\,dV$ *as an iterated integral in six different ways, where* E *is the solid bounded by* $y = 4 - x^2 - 4z^2$ *and* $y = 0$*.*

Problem 2 (Stewart, Exercise 15.6.33)**.** *Sketch the solid whose volume is given by the triple integral*

$$\int_0^1 \int_{\sqrt{x}}^1 \int_0^{1-y} f(x,y,z)\,dzdydx.$$

Write five other iterated integrals that are equal to the given iterated integral. [Note: Sketch given in the book.]

Problem 3 (Stewart, Exercise 15.6.36)**.** *Write five other iterated integrals that are equal to the iterated integral*

$$\int_0^1 \int_y^1 \int_0^z f(x,y,z)\,dxdzdy.$$

Problem 4 (Stewart, Exercise 15.6.(37,38))**.** *Use geometry to evaluate the following double integrals.*

(1) $\iiint_C (4+5x^2yz^2)\,dV$*, where* C *is the cylindrical region given by* $x^2+y^2 \le 4$ *and* $-2 \le z \le 2$*.*

(2) $\iiint_B (z^3 + \sin y + 3)\,dV$*, where* B *is the unit ball* $x^2 + y^2 + z^2 \le 1$*.*

Problem 5 (Stewart, Exercise 15.6.42)**.** *Find the mass and center of mass of the tetrahedron in the first octant bounded by the plane* $x + y + z = 1$ *with density given by* $\rho(x,y,z) = y$*.*

References

[1] J. Stewart: *Calculus* 8th Edition, Cengage Learning, Boston 2016.