Mini Problems 16

1. Evaluate the following iterated integrals: (i) $\int_0^1 \int_y^1 x^2 \sin(xy)\, dxdy$ and
(ii) $\int_0^a \int_{y/a}^1 e^{-x^2}\, dxdy$ where $a > 0$ is a constant.

2. Find the volume of the region that is under the graph of $1 - |x| - |y|$ *and above* the xy-plane.

3. Find the value of $\int\int\int_R (1 - z^2)\, dV$ where R is the tetrahedron in $\mathbb{R}^3$ with vertices $(0,0,0)$, $(1,0,0)$, $(0,2,0)$ and $(0,0,3)$.

4. Change the order of integration to find 5 other integrals all equal to

$$\int_0^2 \int_z^2 \int_y^2 f(x,y,z)\, dxdydz.$$