18.022 Recitation Quiz (with solutions)
5 November 2015

1. (5.5.30 in *Colley*) Find the volume of the solid that is bounded by the paraboloid $z = 9 - x^2 - y^2$, the xy-plane, and the boundary of $[-1, 1] \times [-1, 1] \times \mathbb{R}$.

Solution. To find the volume of the region, we integrate 1 over the region. We calculate

$$\begin{aligned}
\text{volume} &= \int_{-1}^{1} \int_{-1}^{1} \int_{0}^{9-x^2-y^2} 1 \, dz \, dy \, dx \\
&= \int_{-1}^{1} \int_{-1}^{1} 9 - x^2 - y^2 \, dy \, dx \\
&= \int_{-1}^{1} [9y - x^2 y - y^3/3]_{-1}^{1} \, dx = \boxed{100/3}.
\end{aligned}$$

□