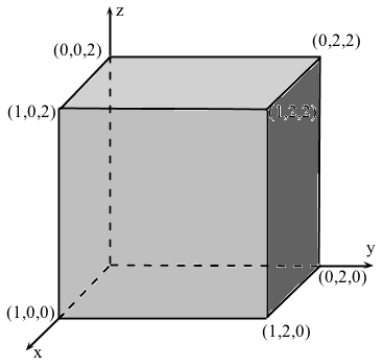
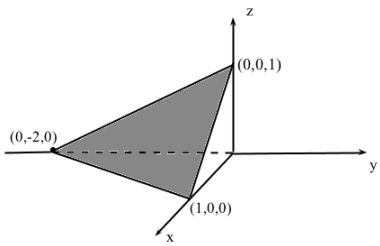
Extra problemset 1, MATH 550

(1) Let S denote the surface of the rectangular box in the picture below and let $\mathbf{n}$ denote outward unit normal to S. Let $\mathbf{F} = xy\mathbf{e_1} + z\mathbf{e_2} + z\mathbf{e_3}$. Compute $\iint_S \mathbf{F} \cdot \mathbf{n}\, dS$.



(2) Let S denote the triangle determined by the plane $2x - y + 2z = 2$ and $x \geq 0$, $y \leq 0$, and $z \geq 0$.



(a) Compute the area of S by computing $\iint_S dS$, viewing S as the graph of a function $z = f(x, y)$ and converting the integral to a repeated integral.

(b) Compute the same area using the area cosine principle (as explained in class).