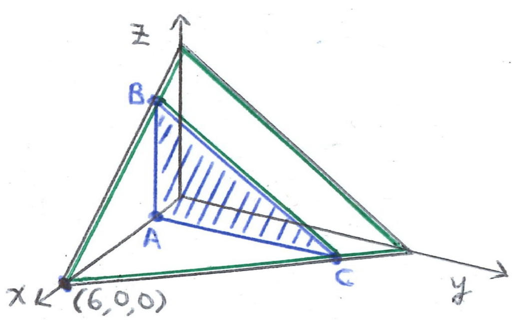
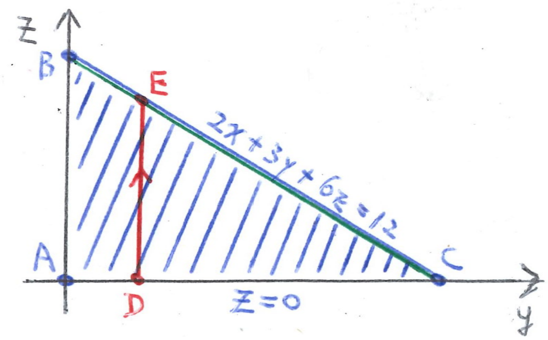
#2.4.4

To determine the limits of integration using the order $dz\, dy\, dx$,

- Starting with the outermost integral with dx, among all the points in the region T, the smallest value of x (which determines the lower limit) is $x = 0$ (from those points on the boundary surface that is part of the yz-plane) and the largest value of x (which determines the upper limit) is $x = 6$ (from that single vertex point of T that lies on the x-axis).
- Moving one level in, for the middle integral with dy, we fix a generic value for the outer variable x (not the extreme values $x = 0$ or $x = 6$, but some generic value in between); essentially we cut/intersect the region T with a vertical plane parallel to the yz-plane and now we only look at those points in this surface of intersection ABC. The smallest value of y (which determines the lower limit) is $y = 0$ (from those points on the boundary line AB, which is part of the xz-plane) and the largest value of y (which determines the upper limit) is $y = 4 - \frac{2}{3}x$ (from that point C of T that belongs to the surfaces $\begin{Bmatrix} 2x + 3y + 6z = 12 \\ z = 0 \end{Bmatrix}$)





- Moving another level in, for the innermost integral with dz, we fix a generic value for the variable y (not the extreme values $y = 0$ or $y = 4 - \frac{2}{3}x$, but some generic value in between); essentially we cut/intersect the triangle ABC with a vertical line parallel to the z-axis and now we only look at those points on this line of intersection DE. The smallest value of z (which determines the lower limit) is $z = 0$ (from the point D) and the largest value of z (which determines the upper limit) is $z = 2 - \frac{1}{3}x - \frac{1}{2}y$ (from that point E that belongs to the surface $2x + 3y + 6z = 12$).