(1) Sketch the region of integration and change the order of integration for \( \int_{1}^{2} \int_{0}^{\ln x} f(x, y) dy dx \).

\[
\int_{0}^{\ln 2} \int_{0}^{2} f(x, y) dx dy \]

(2) Evaluate the integral \( \int_{0}^{4} \int_{0}^{2} \frac{1}{y^3 + 1} dy dx \).

\[
\int_{0}^{2} \int_{0}^{y^2} \frac{1}{y^3 + 1} dx dy = \frac{1}{3} \ln 9
\]

(3) Evaluate \( \iiint_{E} 6xy \ dV \) where \( E \) lies under the plane \( z = 1 + x + y \) and above the region in the \( xy \)-plane bounded by the curves \( y = \sqrt{x} \), \( y = 0 \), and \( x = 1 \).

\[
\int_{0}^{1} \int_{y^2}^{1} \int_{0}^{1+x+y} 6xy \ dz \ dx \ dy = \frac{65}{28}
\]

(4) Find the volume of the solid tetrahedron enclosed by the coordinate planes and the plane \( 2x + y + z = 4 \).

\[
\int_{0}^{2} \int_{0}^{4-2x} \int_{0}^{4-y-2x} 1 \ dz \ dy \ dx = \frac{16}{3}
\]