1. Evaluate
\[ \int_0^1 \int_0^z \int_0^z xyz \, dx \, dy \, dz. \]
2. Let $D$ be a rectangle which has corners at the points $(0,0), (0,a), (b,0), (a,b)$. Compute the average value of the function

$$f(x, y) = xy$$

on $D$. Express your answer in terms of the area of $D$. 
3. Let $E$ be the solid bounded above by the paraboloid $z = 2 - x^2 - y^2$ and below by the paraboloid $z = x^2 + y^2$. Set up (but do not evaluate) a triple integral expressing the volume of the solid $E$. 
4. Find the \textit{area} of the cone \( z^2 = x^2 + y^2 \) between \( z = 0 \) and \( z = 1 \).
5. For the following integrals, say if they are positive, negative, or zero. Give reasons supporting your answers.

(a) \( \int_{-0.01}^{0.01} \int_{-0.01}^{0.01} \cos(x^3 + y^3) \, dx \, dy \)

(b) \( \int_{0}^{1} \int_{0}^{1} \int_{-1}^{1} (x^{17} \cos x)(y^2 + z^2) \, dx \, dy \, dz \)

(c) \( \int_{-1}^{1} \int_{0}^{1} e^{-x^6 - y^4} \, dx \, dy \)
6. Rewrite the following integral in the order $dx \, dy$:

$$\int_{-1}^{1} \int_{0}^{1-x^2} f(x, y) \, dy \, dx$$