1. Use Fubini theorem to compute the following multiple integrals:

a) \( \int_D (x - y) \, dA \), where \( D \) is a triangle with vertices (0, 0), (1, 0), and (2, 1).

In the following problems \( B \) is the domain in \( \mathbb{R}^3 \) defined by

\[
B = \{0 \leq x \leq 1, 0 \leq y \leq 1, 0 \leq z \leq xy\}.
\]

b) \( \int_B x \, dV \),

c) \( \int_B y \, dV \),

d) \( \int_B z \, dV \),

e) \( \int_B xy \, dV \).

2. Use change of variables formula (together with Fubini theorem) to compute the following integrals.

a) \( \int_S (x^2 + y^2) \, dV \), where \( S = \{x^2 + y^2 \leq 2x\} \).

b) \( \int_S \sqrt{1 - \frac{x^2}{a^2} - \frac{y^2}{b^2}} \, dV \), where \( S = \{\frac{x^2}{a^2} + \frac{y^2}{b^2} \leq 1\} \).
3. Find the area of a curvilinear quadrangle bounded by the arcs of the parabolas

\[ x^2 = ay, x^2 = by, y^2 = \alpha x, y^2 = \beta x, \quad \text{where} \quad 0 < a < b, \ 0 < \alpha < \beta. \]

Hint: introduce new variables \((u, v)\) such that \(x^2 = uy, y^2 = vx\).

4. In what ratio does the hyperboloid \(\{x^2 + y^2 - z^2 = a^2\}\) divide the volume of the ball \(\{x^2 + y^2 + z^2 \leq 3a^2\}\).

Problem Each subproblem of 1 is 5 points. All other problems and subproblems are 10 points each.