1. [10 pts] Compute the line integral
\[ \int_c \ln zdz - ydy \]
along the path \( c(t) = \left( \tan \left( \frac{\pi}{4} t \right), 2t, e^{t^2} \right) \) where \( t \in [0, 1] \).

2. [10 pts] Find a parametrization for the following surface:
\[ 2x^2 + y^2 + z^2 - 8x = 1. \]

3. [10 pts] Consider the surface
\[ z = 3x^2 + 8xy. \]
Find the equation of the tangent plane at \((x, y, z) = (1, 0, 3)\).

4. [10 pts] Find the area of the surface defined by
\[ x + y + z = 1 \text{ and } x^2 + 2y^2 \leq 1. \]

5. [10 pts] Evaluate the line integral
\[ \int_c -e^y \cos \pi zdz - xe^y \cos \pi zdz + \pi xe^y \sin \pi zdz \]
where \( c \) is an oriented simple curve connecting \((-1, \ln 2, -\frac{1}{2})\) to \((\sqrt{2}, \frac{3}{4}, 4)\).