Math 5C, Quiz 1

1. Let $D$ be a simply connected set in $\mathbb{R}^3$. State the definition of a gradient vector field defined on $D$ and state another equivalent formulation.

2. Find an equation of the plane tangent to $r(u, v) = (e^u, e^v, uv)$ at $(e^2, 1, 0)$.

3. Evaluate $\int_c \mathbf{F} \cdot d\mathbf{s}$ when $\mathbf{F}(x, y, z) = (yz, xz, xy)$ and $\mathbf{c}(t) = (e^t, e^{2t}, e^{3t})$, $t \in [0, 2]$. 