1. A surface in $\mathbb{R}^3$ is given by $xy + \cos(yz) = 1$. Find an equation for the plane tangent to this surface at $(1, 0, 1)$.

2. Find a parametric formula for the line tangent to the path $(t, t^2, t^3)$ at $(1, 1, 1)$.

3. Compute the length of the path $(\cos(2t), \sin(2t), t^2)$, $0 \leq t \leq 1$.

4. Compute the curl and the divergence of the vector field $(x + yz, y + xz, z + xy)$.

5. Compute the double integral of $xe^y\,dy\,dx$ over the rectangle $-2 \leq x \leq 4$, $0 \leq y \leq 1$.

6. A kid is sucking on a cylindrical popsicle with radius 2 cm and height 4 cm. If the radius is shrinking at the rate of 0.1 cm/s and the height at the rate of 0.2 cm/s, how fast is the popsicle being consumed? (i.e. how fast is the volume decreasing?)