Q1) Find the arc length of the curve \( x = e^t \cos 2t, y = e^t \sin 2t, z = e^t, 0 \leq t \leq 2\pi \).

Q2)(a) Find a vector giving the direction of most rapid decrease of the function

\[ f(x, y, z) = \ln \frac{yz}{x}, \text{ at } P\left(\frac{1}{3}, \frac{1}{6}, \frac{1}{2}\right) \]

What is the rate of most rapid decrease?

(b) Find directional derivative of the above \( f(x, y, z) \) in the direction of vector from \((1, 4, 5)\) to \((2, 5, 4)\)