Q1. Find the plane determined by the intersecting two lines $L_1$ and $L_2$

$L_1: x = -1 + t, \quad y = 2 + t, \quad z = 1 - t$

$L_2: x = 1 - 4s, \quad y = 1 + 2s, \quad z = 2 - 2s$

Q2. Sketch the surface

$$x^2 - y^2 + z^2 - 2x + 2y + 4z + 2 = 0$$
Q3 Let \( f(x,y) = x^2 - xy + y^2 - y \). Find the directions \( u \) and the value \( D_u f(-1,1) \) for which

a) \( D_u f(-1,1) \) is largest  

b) \( D_u f(-1,1) = 0 \)  
c) \( D_u f(-1,1) \) is smallest

d) \( D_u f(-1,1) = 4 \)

Q4 Find the equations of the \textit{tangent plane} and the \textit{normal line} to the surface

\[ x^2 + 2xy - y^2 + z^2 = 7 \]

at the point \( P_0 = (1, -1, 3) \).