Problem statement Suppose the line L_1 is $\begin{cases} x = 2t + 1 \\ y = -t - 1 \\ z = 3t \end{cases}$ and the line L_2 is $\begin{cases} x = 3s + 2 \\ y = 5s - 2 \\ z = -4 \end{cases}$.
Define the function $f(s, t)$ to be the distance between the point on line L_1 with parameter value s and the point on the line L_2 with parameter value t.

a) Find and classify (max/min/saddle) all critical points of $f(s, t)$. (There is exactly one!)

b) The line segment which has endpoints characterized by the values of s and t discovered in a) has an interesting geometric property related to L_1 and L_2. What is this property? Use a drawing to help your explanation.