Challenge Set #4

1) Find the point $Q \in \ell$ so that $\left|\overrightarrow{PQ}\right|$ is a minimum given that $P(6,3,-1) \notin \ell$ and $\ell : (x, y, z) = (3,-2,0) + t(4,3,-2)$. What techniques can you use to verify your answer?

2) One line passes through points A(-2,2,-6) and B(-5,-1,-10) while a second line passes through points C(3,-4,-5) and D(3,-3,-3). Determine the shortest distance between these lines and determine the locations on the lines where this shortest distance occurs.

3) Given the lines $\frac{x-1}{2} = \frac{y}{4} = \frac{z+1}{3}$ and $\frac{x}{2} = \frac{y+1}{1} = \frac{z+2}{-3}$, use a variety of techniques to show that they are either skew or that they intersect.

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