The following two lines intersect:

\[ \mathbf{r}_1 = (1, -3, 1) + t (3, -1, -1) \]
\[ \mathbf{r}_2 = (8, 0, 4) + s (-1, 1, 1) . \]

1. Find their point of intersection.

2. Find an exact expression for the angle between the two lines.

3. Write an equation for the plane that contains both lines, in the form

\[ Ax + By + Cz + D = 0. \]