Sort It Out — Vector Lines in Space

For each pair of lines, determine whether they intersect, are parallel, are coincident or are skew. If they intersect, find the point of intersection.

1	$\boldsymbol{r} = \begin{pmatrix}2\\3\\0\end{pmatrix} + \lambda\begin{pmatrix}-1\\4\\3\end{pmatrix}$ and $\boldsymbol{r} = \boldsymbol{i} + 2\boldsymbol{k} + \mu(3\boldsymbol{i} - 12\boldsymbol{j} - 9\boldsymbol{k})$	**2**	$\boldsymbol{r} = -3\boldsymbol{j} - 5\boldsymbol{k} + \lambda(-\boldsymbol{i} + 4\boldsymbol{j} + 2\boldsymbol{k})$ and $\boldsymbol{r} = \begin{pmatrix}8\\-8\\-11\end{pmatrix} + \mu\begin{pmatrix}-6\\-3\\2\end{pmatrix}$
3	$\boldsymbol{r} = \begin{pmatrix}3\\-3\\5\end{pmatrix} + \lambda\begin{pmatrix}-1\\4\\2\end{pmatrix}$ and $\frac{x+2}{2} = \frac{y-9}{-4} = z - 5$	**4**	$\frac{x-8}{-3} = \frac{y-6}{7} = z + 3$ and $\boldsymbol{r} = \begin{pmatrix}4\\1\\-6\end{pmatrix} + \mu\begin{pmatrix}4\\-1\\1\end{pmatrix}$
5	$\boldsymbol{r} = \begin{pmatrix}-1\\-2\\1\end{pmatrix} + \lambda\begin{pmatrix}3\\-1\\-6\end{pmatrix}$ and $\boldsymbol{r} = -4\boldsymbol{j} + 9\boldsymbol{k} + \mu(7\boldsymbol{i} - 4\boldsymbol{j} + 3\boldsymbol{k})$	**6**	$\boldsymbol{r} = \begin{pmatrix}8+4\lambda\\-1+4\lambda\\-2-8\lambda\end{pmatrix}$ and $\boldsymbol{r} = (7-\mu)\boldsymbol{i} + (-2-\mu)\boldsymbol{j} + 2\mu\boldsymbol{k}$
7	$\frac{x+5}{8} = \frac{y}{-2} = \frac{z-2}{-4}$ and $\boldsymbol{r} = \begin{pmatrix}7-2\lambda\\-3+0.5\lambda\\5+\lambda\end{pmatrix}$	**8**	$\boldsymbol{r} = \begin{pmatrix}\lambda\\3-\lambda\\2+4\lambda\end{pmatrix}$ and $\frac{x+2}{-5} = y = \frac{z-1}{-2}$
9	$\boldsymbol{r} = (-11+2\lambda)\boldsymbol{i} - \lambda\boldsymbol{j} + (3+4\lambda)\boldsymbol{k}$ and $\boldsymbol{r} = \begin{pmatrix}-9\\-15\\17\end{pmatrix} + \mu\begin{pmatrix}4\\5\\3\end{pmatrix}$	**10**	$\boldsymbol{r} = \begin{pmatrix}-3\\3\\2\end{pmatrix} + \lambda\begin{pmatrix}3\\1\\2\end{pmatrix}$ and $\frac{x-1}{3} = \frac{y+5}{-1} = \frac{z-7}{4}$

A	The lines intersect	**B**	The lines are parallel
2 $(2, -11, -9)$ **4** $(12, -1, -4)$ **9** $(-1, -5, 23)$		**1, 7**	
C	The lines are coincident	**D**	The lines are skew
3, 6		**5, 8, 10**	