MATH 237: Vector Calculus

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Consider the lines

$$\ell_1 : \langle 2, 3, 4 \rangle + t \langle 5, 1, 1 \rangle$$

$$\ell_2 : \langle -3, 2, 3 \rangle + t \langle 15, 3, 3 \rangle$$

$$\ell_3 : \langle 10, 2, 3 \rangle + t \langle 5, 1, 1 \rangle$$

$$\ell_4 : \langle 2, -2, 2 \rangle + t \langle 6, 2, 1 \rangle$$

1. For each pair of lines, explain why they are the same, distinct and parallel, intersecting, or skew.

2. Determine the point of intersection of any intersecting pairs of distinct lines. Determine the angle at which the lines intersect.

3. Find the distance between any non-intersecting pairs.

4. Generalize the results of (3) above to a general formula for finding the distance between parallel and skew lines. Give geometric arguments to support your answers.

5. Satisfy yourself that given any two lines, you can generalize your work here to discover if the lines are the same, parallel, intersecting, or skew.

6. Satisfy yourself that you can generalize your work here to discover the distance between a pair of lines, or a line and a point.

This assignment is due Wednesday, February 5.