MATH 105: Finite Mathematics
1-2: Pairs of Lines

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Winter Quarter, 2006
Outline

1. Pairs of Lines
2. Perpendicular Lines
3. Conclusion
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3. Conclusion
There are several ways in which two lines can interact with each other. In this section we will examine those possibilities and find out how to determine which relationship a pair of lines has.

Pairs of Lines

Let $L$ and $M$ be two lines in a plane. Then $L$ and $M$ must be:

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While we can certainly identify how two lines are related by graphing them, it is often better to compare equations.

**Comparing Lines**

A pair of lines can be classified as intersecting, parallel, or coincident based on the lines slope and $y$-intercept.

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Using the slope and $y$-intercept, identify each pair of lines as intersecting, parallel, or coincident.

1. The lines $3x + 5y = 15$ and $6x + 10y = 30$.

2. The lines $7x - 2y = 14$ and $-14x + 4y = 28$.

3. The lines $4x - 6y = 12$ and $6x + 4y = -8$. 
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3. The lines $4x - 6y = 12$ and $6x + 4y = -8$. (intersecting)
   
   \[ y = \frac{2}{3}x - 2 \quad y = -\frac{3}{2}x - 2 \]
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In the last example, not only were the lines intersecting, but they intersected each other at right angles.

Limes $L_1$ and $L_2$ with slopes $m_1$ and $m_2$ are perpendicular if $m_1 \cdot m_2 = -1$

In practice, the slopes of perpendicular lines are negative reciprocals of each other. This makes it easy to check for perpendicular lines, and to construct a line perpendicular to a given line.
Examples

Use the line $2x - 10y = 20$ to perform the following tasks.

1. Find the equation of a line parallel to this line through the point $(1, 2)$.

2. Find the equation of a line perpendicular to this line through the point $(1, 2)$.

3. Graph all three lines.
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