Mini-Lecture 1.3
Lines

Learning Objectives:
1. Calculate and interpret the slope of a line
2. Graph lines given a point and a slope
3. Find the equation of a vertical line
4. Use the point-slope form of a line; identify horizontal lines
5. Find the equation of a line, given two points
6. Write the equation of a line in slope-intercept form
7. Identify slope and y-intercept of a line from its equation
8. Graph lines written in general form using intercepts
9. Find equations of parallel lines
10. Find equations of perpendicular lines

Examples:
1. Determine the slope of the line containing the points (-5,4) and (0,7).
2. Graph the line containing the point (2,4) with slope \( m = \frac{2}{3} \).
3. Write an equation of the line satisfying the given conditions:
   (a) Slope = \( \frac{3}{4} \), containing the point (-2,4).
   (b) Containing the points (4,2) and (3,-4).
   (c) x-intercept = 3, y-intercept = -2.
   (d) Vertical line containing (5,-1).
   (e) Parallel to the line \( 3x - 4y = 5 \) and containing the point (3,-6).
4. Find the slope and y-intercept of the line \( 4x - 6y = -3 \).
5. Find the intercepts and graph the line \( -2x + y = 4 \).

Teaching Notes:
• This material is not usually hard for the students.
• When finding the slope, make sure they don’t reverse the x- and y-values.
• They should learn the various forms for the equation of a line and be comfortable solving standard form for \( y \).
• Simplifying the equations should be emphasized.

Answers:
1. \( m = \frac{7 - 4}{0 - (-5)} = \frac{3}{5} \)  
3. (a) \( y = \frac{3}{4} x + \frac{11}{2} \)
3. (b) \( y = 6x - 22 \)  
(c) \( y = \frac{2}{3} x - 2 \)  
(d) \( x = 5 \)  
(e) \( y = \frac{3}{4} x - \frac{33}{4} \)
4. Slope = \( \frac{2}{3} \); y-intercept = \( \frac{1}{2} \)  
5. x-intercept = -2, y-intercept = 4

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