Identify Dependent Systems by Graphing Coincident Lines

Original worked example / complete source key

Prompt: Graph the system y = 3x - 2 and 6x - 2y = 4. Determine whether the system is dependent by graphing and confirm algebraically.

Answer: The system is dependent; the lines coincide and there are infinitely many solutions.

Reason: Rewrite 6x - 2y = 4 in slope-intercept form: subtract 6x to get -2y = -6x + 4, then divide by -2 to get y = 3x - 2. Both equations are y = 3x - 2, so they have the same slope 3 and the same y-intercept -2. Plotting points for each equation, such as (0, -2), (1, 1), and (2, 4), places all points on the same line. Algebraically, multiplying y = 3x - 2 by 2 gives 2y = 6x - 4, which rearranges to 6x - 2y = 4, so one equation is a nonzero multiple of the other.

Check: Substitute two different points from the line into both original equations. For (1, 1): 1 = 3(1) - 2 is true, and 6(1) - 2(1) = 4 is true. For (2, 4): 4 = 3(2) - 2 is true, and 6(2) - 2(4) = 4 is true. Both points satisfy both equations, confirming coincidence.

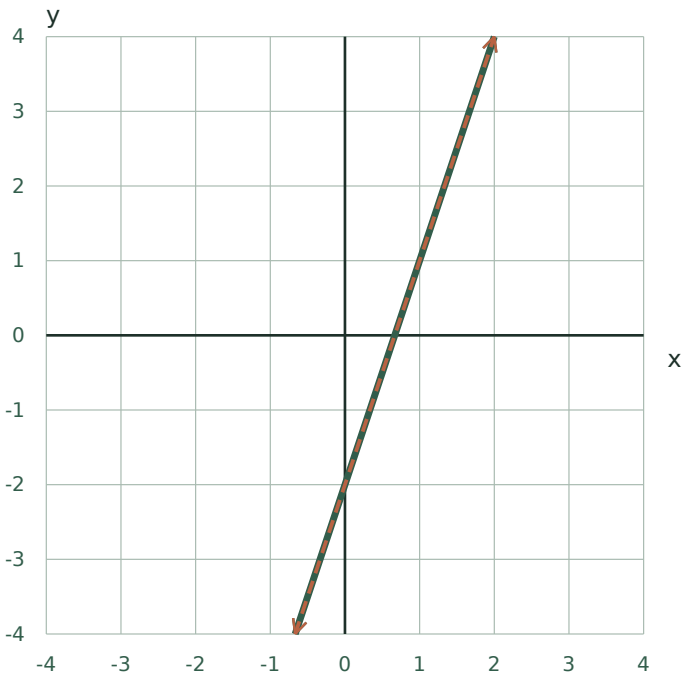
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Worked example / completed source graph

Graph the system y = 3x - 2 and 6x - 2y = 4. Determine whether the system is dependent by graphing and confirm algebraically.

Line 1 (solid green): y = 3x - 2

Line 2 (long-dashed orange): 6x - 2y = 4



Both equations have the SAME path: infinitely many common solutions.

Horizontal interval = 1; vertical interval = 1. This is a display window, not a new domain.