Graphing vs Substitution: Solving Linear Systems Two Ways

Original tasks 1, 2, 3, 4 / complete keys

Task 1

Solve by substitution: y = 3x - 2 and x + y = 6. Then describe the graph.

Answer: (2, 4)

Reason: Substitute 3x - 2 for y in x + y = 6: x + 3x - 2 = 6, so 4x = 8, x = 2. Then y = 3(2) - 2 = 4. Check: 2 + 4 = 6 and 4 = 3(2) - 2. The graph shows two lines intersecting at (2, 4).

Check: Substitute (2, 4) into both original equations; both should be true.

Task 2

Solve by graphing: y = -x + 5 and y = 2x - 1. Describe the lines and intersection.

Answer: (2, 3)

Reason: Line y = -x + 5 passes through (0, 5) and (5, 0). Line y = 2x - 1 passes through (0, -1) and (1, 1). They intersect at (2, 3). Check: 3 = -2 + 5 and 3 = 4 - 1.

Check: Substitute (2, 3) into both equations; confirm both are true.

Task 3

Solve by substitution: 2x + y = 7 and y = x + 1. Then verify by graphing.

Answer: (2, 3)

Reason: Substitute x + 1 for y in 2x + y = 7: 2x + x + 1 = 7, so 3x = 6, x = 2. Then y = 3. Graph: y = -2x + 7 and y = x + 1 intersect at (2, 3).

Check: Check both equations with (2, 3); graph both lines and confirm intersection.

Task 4

Solve by graphing: y = 2x + 1 and y = 2x - 3. State the number of solutions and explain algebraically.

Answer: No solution

Reason: Both lines have slope 2 but different intercepts, so they are parallel. Algebraically, substituting gives 2x + 1 = 2x - 3, which simplifies to 1 = -3, a false statement.

Check: Compare slopes and intercepts; substitution leads to a false equation.

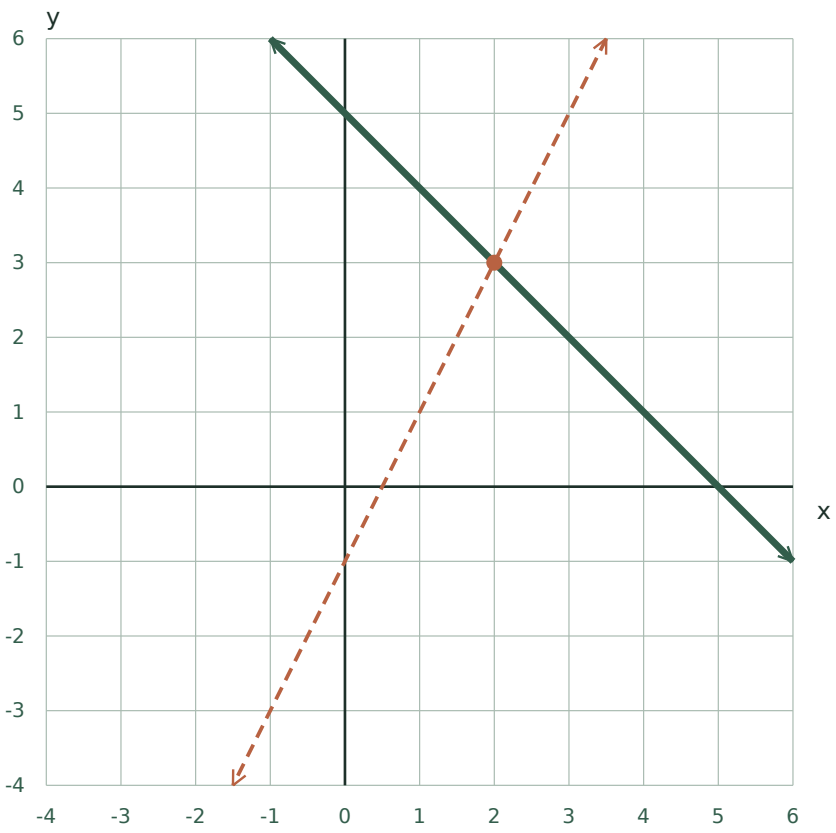
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Task 2 / completed source graph

Solve by graphing: y = -x + 5 and y = 2x - 1. Describe the lines and intersection.

Line 1 (solid green): y = -x + 5

Line 2 (long-dashed orange): y = 2x - 1



Common solution: (2, 3).

Marked point: (2, 3).

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

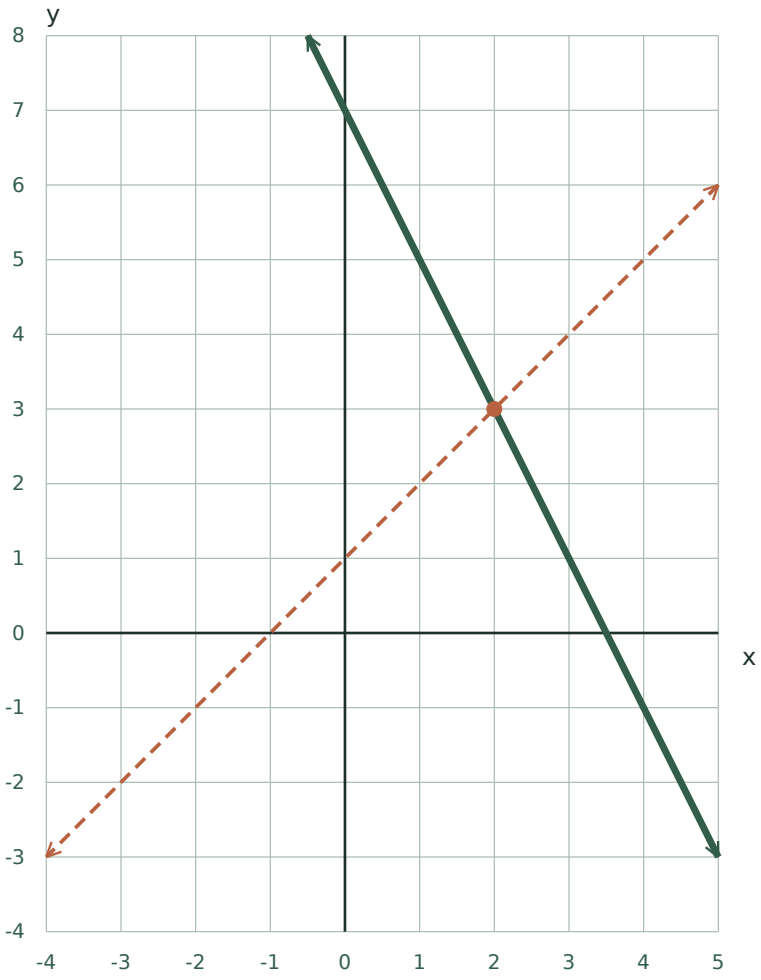
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Task 3 / completed source graph

Solve by substitution: 2x + y = 7 and y = x + 1. Then verify by graphing.

Line 1 (solid green): 2x + y = 7

Line 2 (long-dashed orange): y = x + 1



Common solution: (2, 3).

Marked point: (2, 3).

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

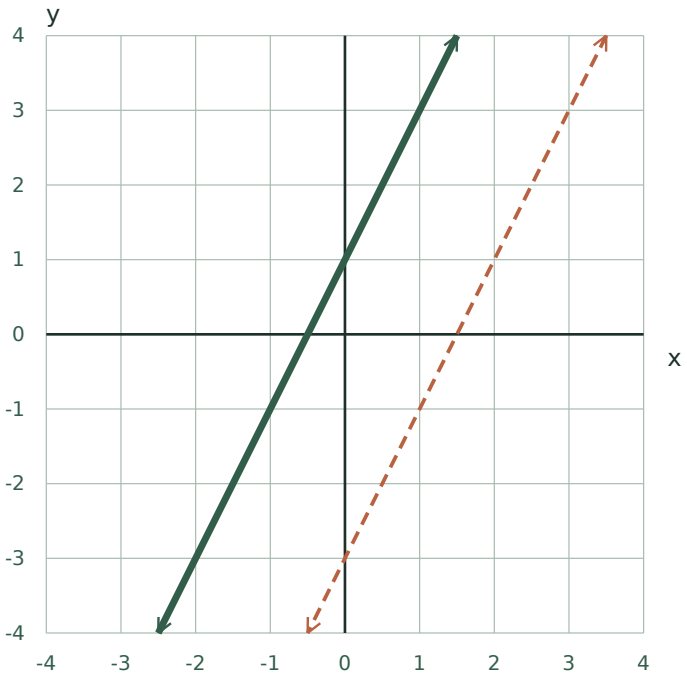
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Task 4 / completed source graph

Solve by graphing: y = 2x + 1 and y = 2x - 3. State the number of solutions and explain algebraically.

Line 1 (solid green): y = 2x + 1

Line 2 (long-dashed orange): y = 2x - 3



No common point satisfies every source equation.

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

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Original rubric / reflection

- [ ] Correctly isolates a variable for substitution.
- [ ] Substitutes into the other equation, not the same one.
- [ ] Solves the single-variable equation accurately.
- [ ] Back-substitutes to find the second variable.
- [ ] Graphs both lines with labeled axes and scale.
- [ ] Reads the intersection and verifies by substitution.
- [ ] Compares both methods and explains agreement or mismatch.
- [ ] Uses clear handwriting convention and labels diagrams.

Reflection: What did you check, what did you change, and what will you try next?