Drawing Curved Graphs from Value Tables: A Practical Guide

Original tasks 1, 2 / complete keys

Task 1

Plot the curve y = 2^x for x from -2 to 2. Build a value table with x = -2, -1, 0, 1, 2. Use a grid where each square represents 1 unit on both axes. (Numerical values are hypothetical examples chosen for clarity.)

Answer: Value table: (-2, 0.25), (-1, 0.5), (0, 1), (1, 2), (2, 4). Plot these points and join them with a single smooth curve that rises gently at first and then more steeply as x increases. The curve passes through (0,1) and never touches the x-axis; it approaches it on the left but stays above it.

Reason: Each output is 2 raised to the input. Negative inputs give fractions below 1, zero gives 1, and positive inputs grow quickly. The points are not symmetric, so the curve is not a U or inverted U; it is a steadily rising curve with increasing steepness.

Check: Compute y for x = 1.5: y = 2^1.5, which is about 2.83 (since 2^1.5 = 2 × √2 ≈ 2.83). Confirm the drawn curve passes through about (1.5, 2.83), between the plotted points (1,2) and (2,4).

Task 2

Plot the curve y = x + 1/x for x from 1 to 4. Build a value table with x = 1, 1.5, 2, 3, 4. Use a grid where each square represents 1 unit on both axes. (Numerical values are hypothetical examples chosen for clarity.)

Answer: Value table: (1, 2), (1.5, about 2.17), (2, 2.5), (3, about 3.33), (4, 4.25). Plot these points and join them with a single smooth curve that rises steadily from x = 1 to x = 4. The smallest plotted value is at x = 1, y = 2, and the curve is not symmetric.

Reason: Adding x and its reciprocal gives outputs that grow as x increases across this interval. On the interval x = 1 to 4 the function is increasing; the minimum of the whole function is at x = 1, the left edge of the chosen range. The relationship is neither quadratic nor cubic nor purely reciprocal.

Check: Compute y for x = 2.5: y = 2.5 + 1/2.5 = 2.5 + 0.4 = 2.9. Confirm the drawn curve passes through (2.5, 2.9), between the plotted points (2, 2.5) and (3, 3.33).

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Original tasks 3, 4 / complete keys

Task 3

Plot the curve y = 3^x for x from -1 to 2. Build a value table with x = -1, -0.5, 0, 0.5, 1, 2. Use a grid where each square represents 1 unit on both axes. (Numerical values are hypothetical examples chosen for clarity.)

Answer: Value table: (-1, about 0.33), (-0.5, about 0.58), (0, 1), (0.5, about 1.73), (1, 3), (2, 9). Plot these points and join them with a single smooth curve that rises steeply as x increases. The curve passes through (0,1) and stays above the x-axis throughout.

Reason: Each output is 3 raised to the input. Negative inputs give fractions below 1, zero gives 1, and positive inputs grow rapidly. The curve is not symmetric and has no turning point in this range; it rises with increasing steepness.

Check: Compute y for x = 1.5: y = 3^1.5, which is about 5.20 (since 3^1.5 = 3 × √3 ≈ 5.20). Confirm the drawn curve passes through about (1.5, 5.20), between the plotted points (1, 3) and (2, 9).

Task 4

Plot the curve y = x + 4/x for x from 1 to 4. Build a value table with x = 1, 1.5, 2, 3, 4. Use a grid where each square represents 1 unit on both axes. (Numerical values are hypothetical examples chosen for clarity.)

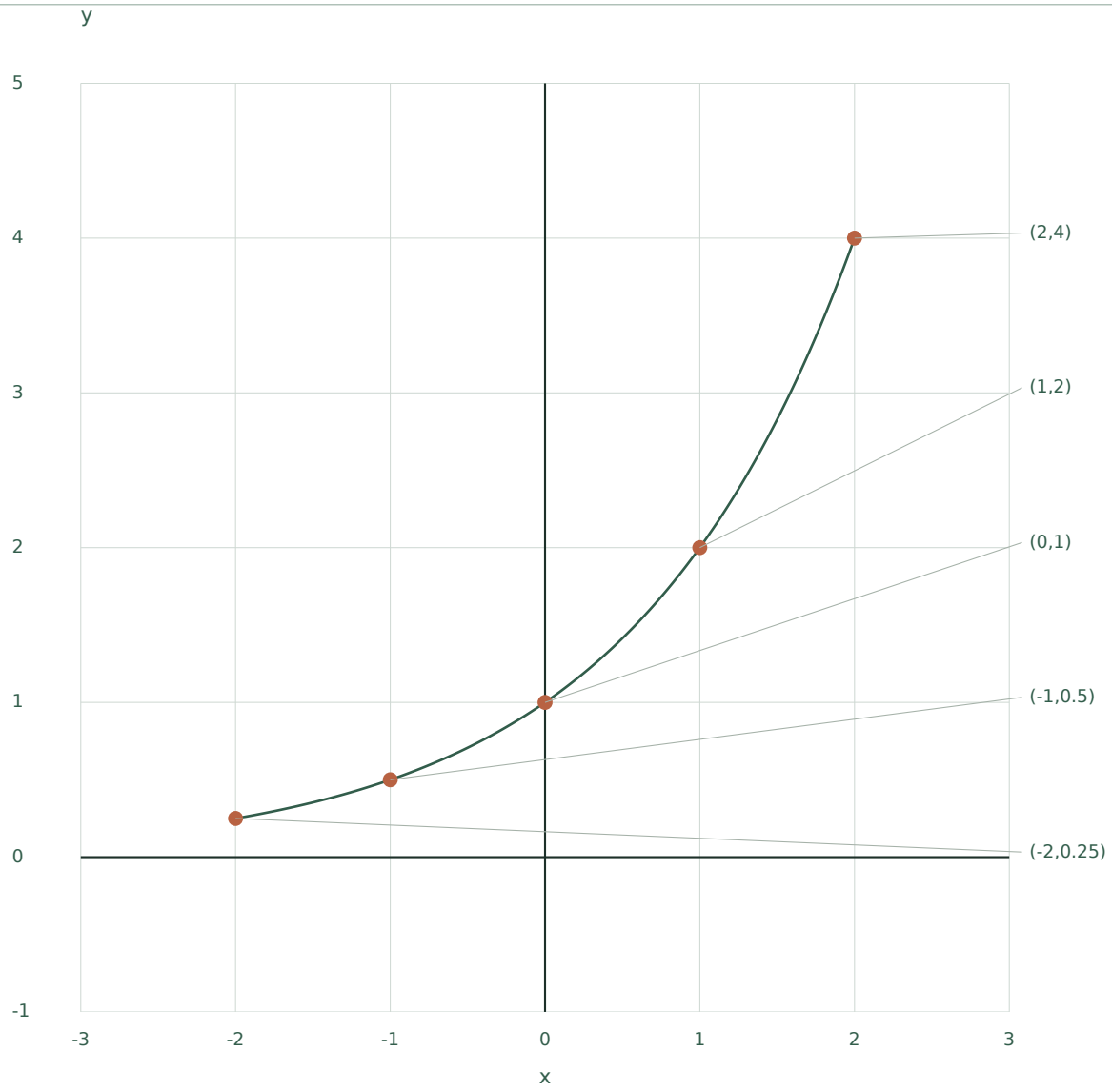
Answer: Value table: (1, 5), (1.5, about 4.17), (2, 4), (3, about 4.33), (4, 5). Plot these points and join them with a single smooth curve that decreases from x = 1 to x = 2, then rises steadily. The curve has a gentle minimum near x = 2 and is not symmetric.

Reason: Adding x and four divided by x gives outputs that are large when x is small (because 4/x is large) and grow roughly like x when x is large. Between x = 1 and x = 3 the two effects balance, producing a shallow turning point near x = 2. The relationship is neither quadratic nor cubic nor purely reciprocal.

Check: Compute y for x = 2.5: y = 2.5 + 4/2.5 = 2.5 + 1.6 = 4.1. Confirm the drawn curve passes through (2.5, 4.1), between the plotted points (2, 4) and (3, about 4.33).

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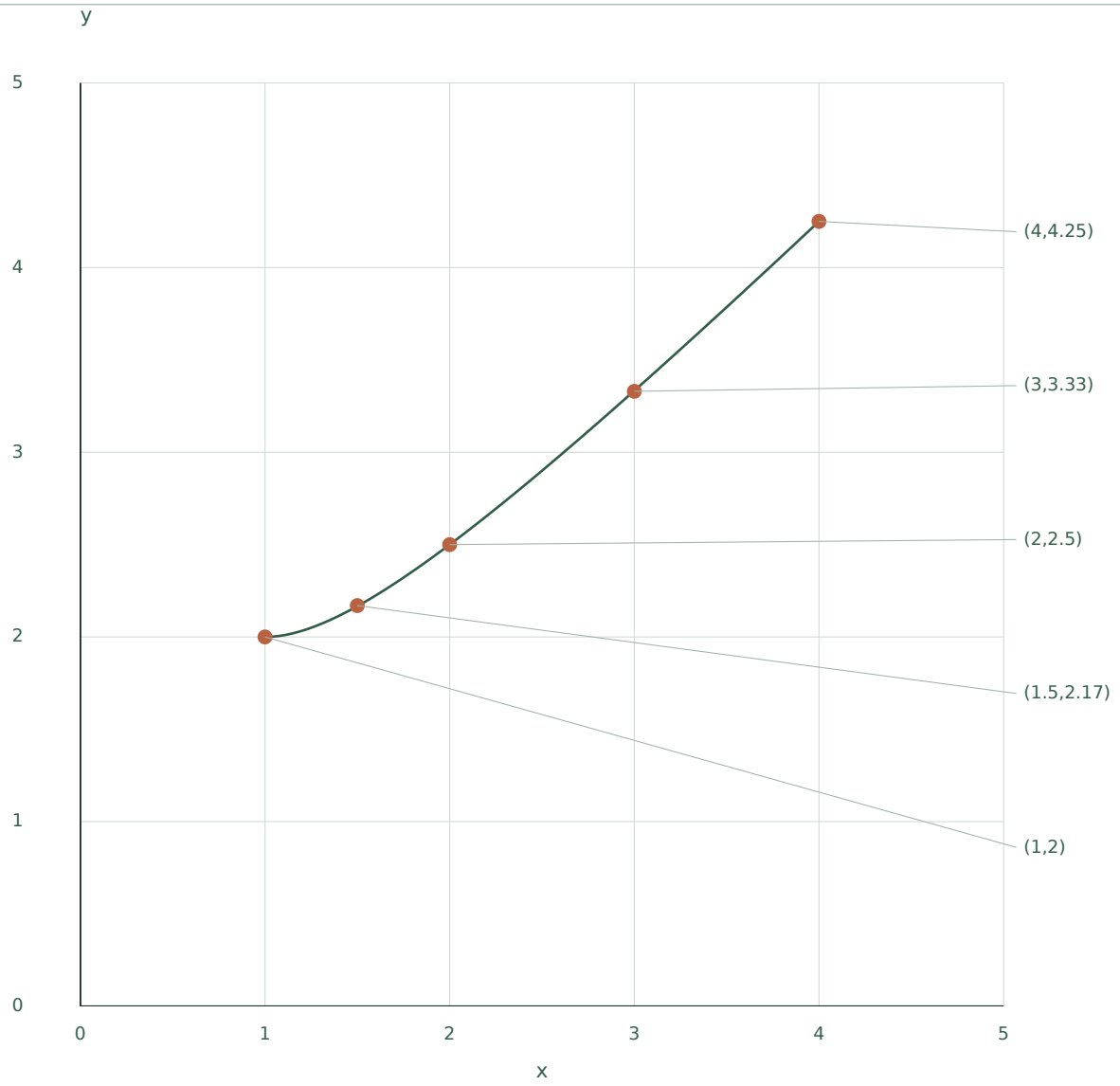
Task 1 answer: y = 2^x with table points



Answer plot: smooth rising curve through the five table points; stays above the x-axis. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

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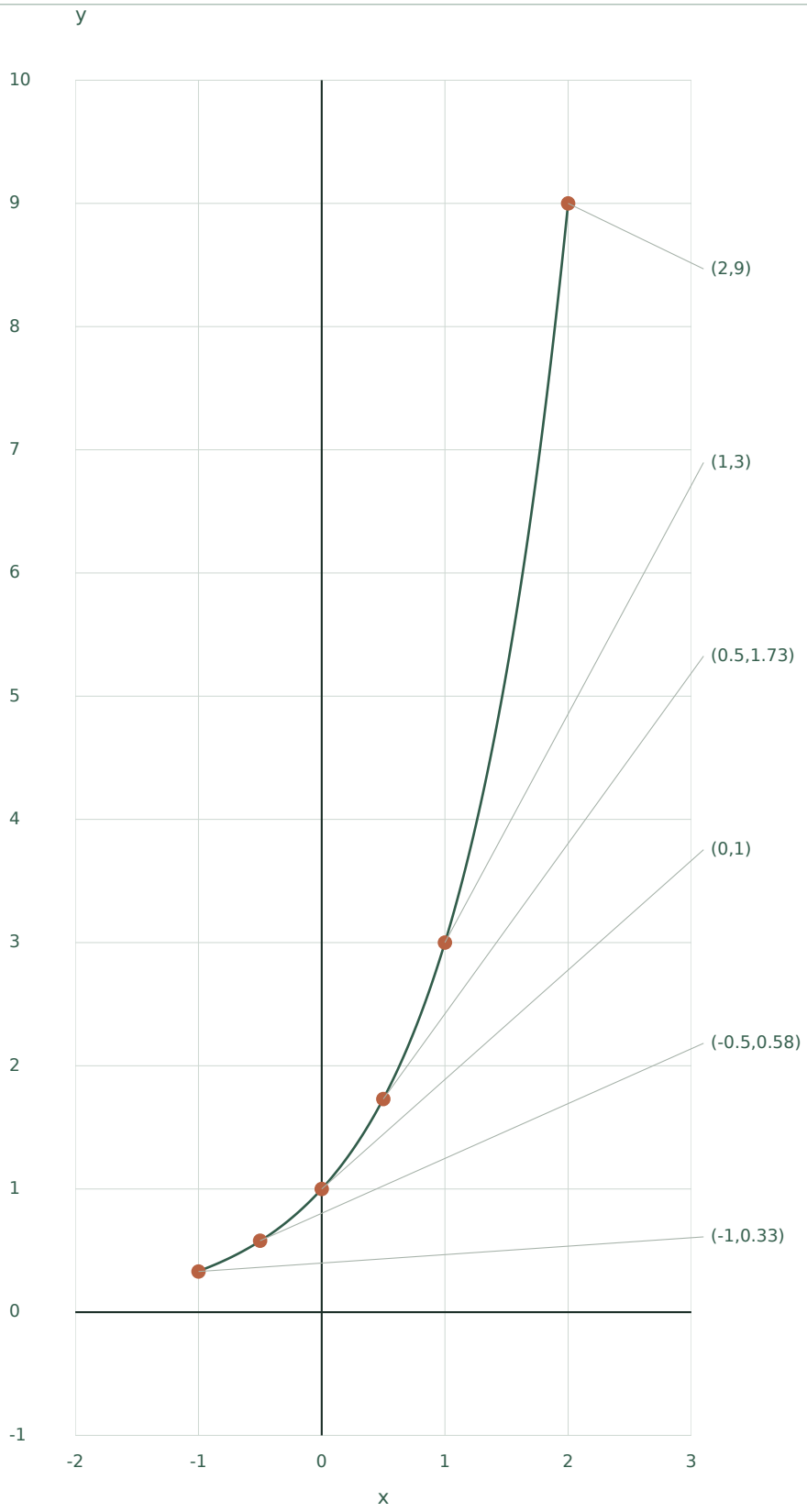
Task 2 answer: y = x + 1/x with table points



Answer plot: smooth steadily rising curve through the five table points on x in [1,4]. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

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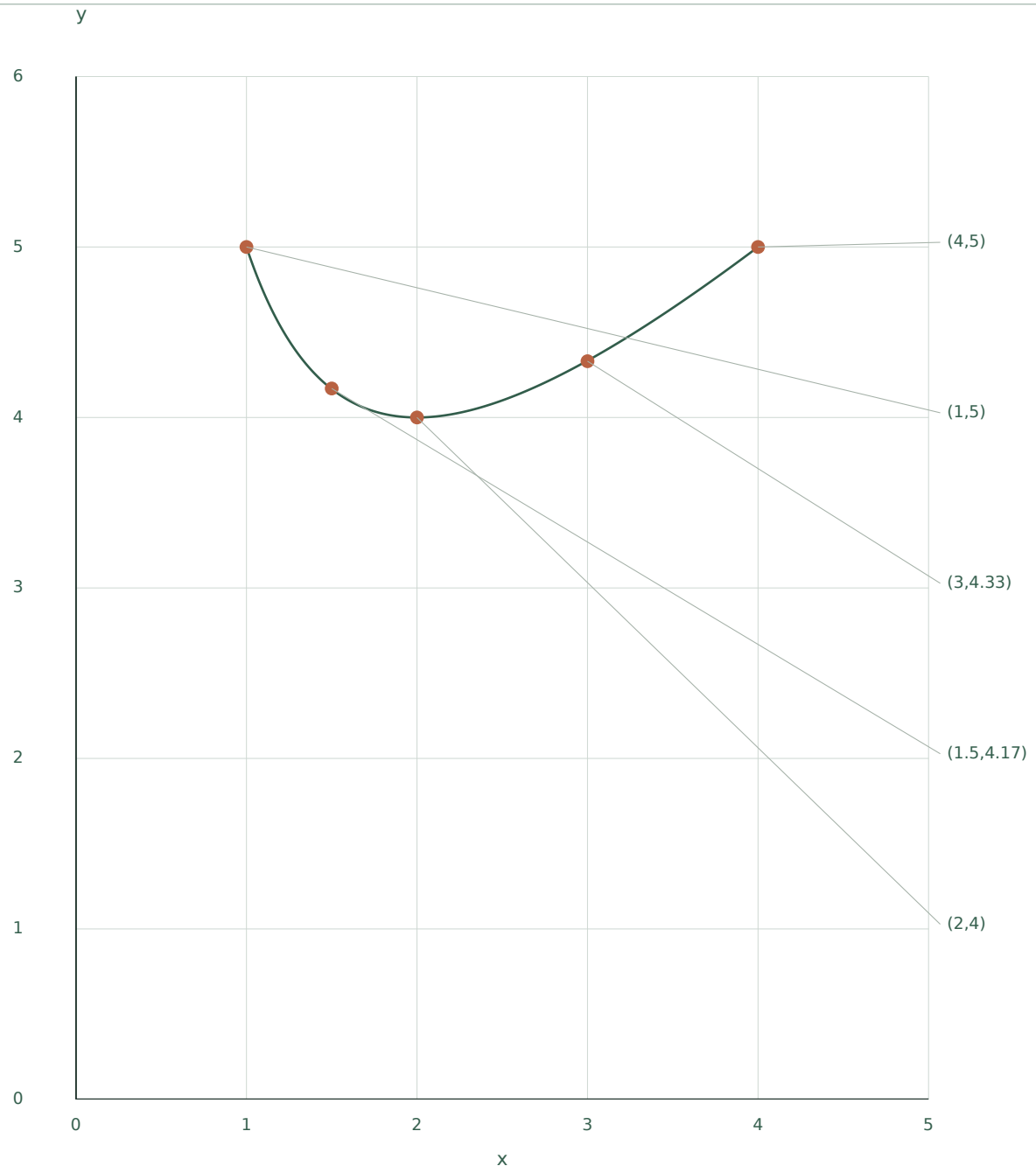
Task 3 answer: y = 3^x with table points



Answer plot: smooth steeply rising curve through the six table points; stays above the x-axis. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

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Task 4 answer: y = x + 4/x with table points



Answer plot: smooth curve with gentle minimum near x=2, through the five table points on x in [1,4]. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

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Source rubric / reflection

- [ ] Value table includes at least five correctly computed entries.
- [ ] Axes are labelled with variable names and a consistent scale.
- [ ] All table points are plotted accurately.
- [ ] Curve is smooth and continuous, passing through or near all plotted points.
- [ ] Curve is labelled with its equation or name.
- [ ] Check method is applied and documented.

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