Graph Quadratic Inequalities: Shade the Solution Region

Original tasks 1, 2, 3 / complete keys

Task 1

Graph $y \leq x^2 - 2x - 3$. Find vertex, intercepts, boundary type, and shade.

Answer: Vertex (1, -4); y-intercept (0, -3); x-intercepts (-1,0) and (3,0); solid parabola opening upward; test (0,0): $0 \leq -3$ false, so shade region not containing (0,0), which is below the parabola (including boundary).

Reason: Vertex $x = -(-2)/(2*1)=1$, $y=1-2-3=-4$. Factor $x^2-2x-3=(x-3)(x+1)$. Non-strict $\leq$ means solid. Test point (0,0) gives false, so shade opposite side from (0,0), i.e., below the parabola.

Check: Test a point inside shaded region, e.g., (1,-5): $-5 \leq 1-2-3=-4$ true. Test outside, e.g., (1,0): $0 \leq -4$ false.

Task 2

Graph $y > -x^2 + 4$. Find vertex, intercepts, boundary type, and shade.

Answer: Vertex (0,4); y-intercept (0,4); x-intercepts (-2,0) and (2,0); dashed parabola opening downward; test (0,0): $0 > 4$ false, so shade region not containing (0,0), which is above the parabola (inside the downward opening).

Reason: Vertex at (0,4). Solve $-x^2+4=0$ gives $x=\pm2$. Strict $>$ means dashed. Test (0,0) false, so shade above the parabola.

Check: Test (0,5): $5 > 4$ true. Test (0,3): $3 > 4$ false.

Task 3

Graph $y \geq x^2 + 2x + 1$. Find vertex, intercepts, boundary type, and shade.

Answer: Vertex (-1,0); y-intercept (0,1); x-intercept (-1,0) (double root); solid parabola opening upward; test (0,0): $0 \geq 1$ false, so shade region not containing (0,0), which is above the parabola (including boundary).

Reason: Vertex $x=-2/(2)=-1$, $y=1-2+1=0$. Factor $(x+1)^2$. Non-strict $\geq$ means solid. Test (0,0) false, so shade above.

Check: Test (-1,1): $1 \geq 0$ true. Test (0,0): $0 \geq 1$ false.

Graph Quadratic Inequalities: Shade the Solution Region

Original tasks 4 / complete keys

Task 4

Graph y < -x^2 + 6x - 5. Find vertex, intercepts, boundary type, and shade.

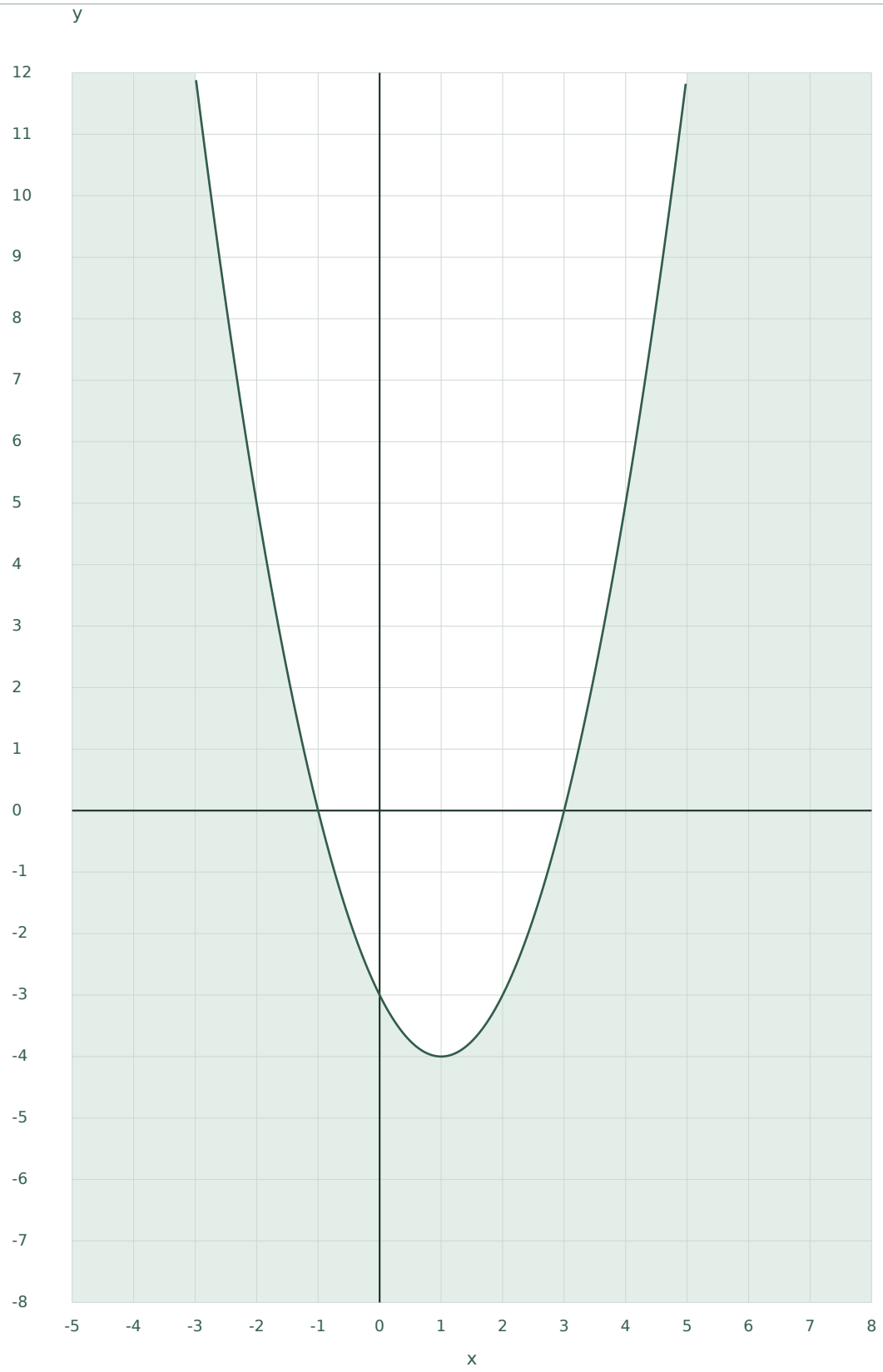
Answer: Vertex (3,4); y-intercept (0,-5); x-intercepts (1,0) and (5,0); dashed parabola opening downward; test (0,0): 0 < -5 false, so shade region not containing (0,0), which is below the parabola (outside the downward opening).

Reason: Vertex x=-6/(2*-1)=3, y=-9+18-5=4. Factor -(x-1)(x-5). Strict < means dashed. Test (0,0) false, so shade below.

Check: Test (3,5): 5 < 4 false. Test (3,3): 3 < 4 true.

Graph Quadratic Inequalities: Shade the Solution Region

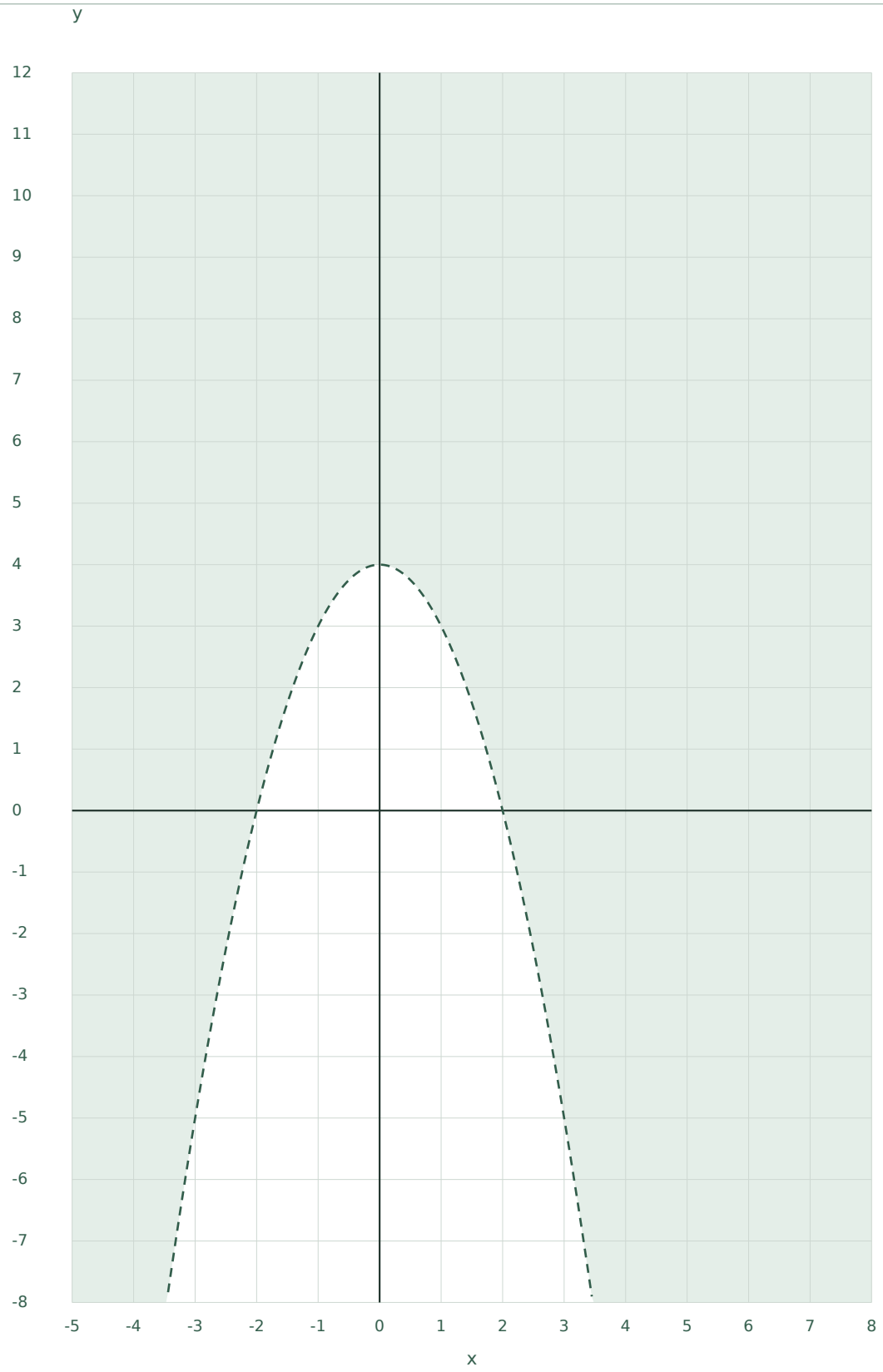
Task 1 / complete graph key



The shaded region is on the requested side of the parabola. Strict comparisons use a dashed boundary.

Graph Quadratic Inequalities: Shade the Solution Region

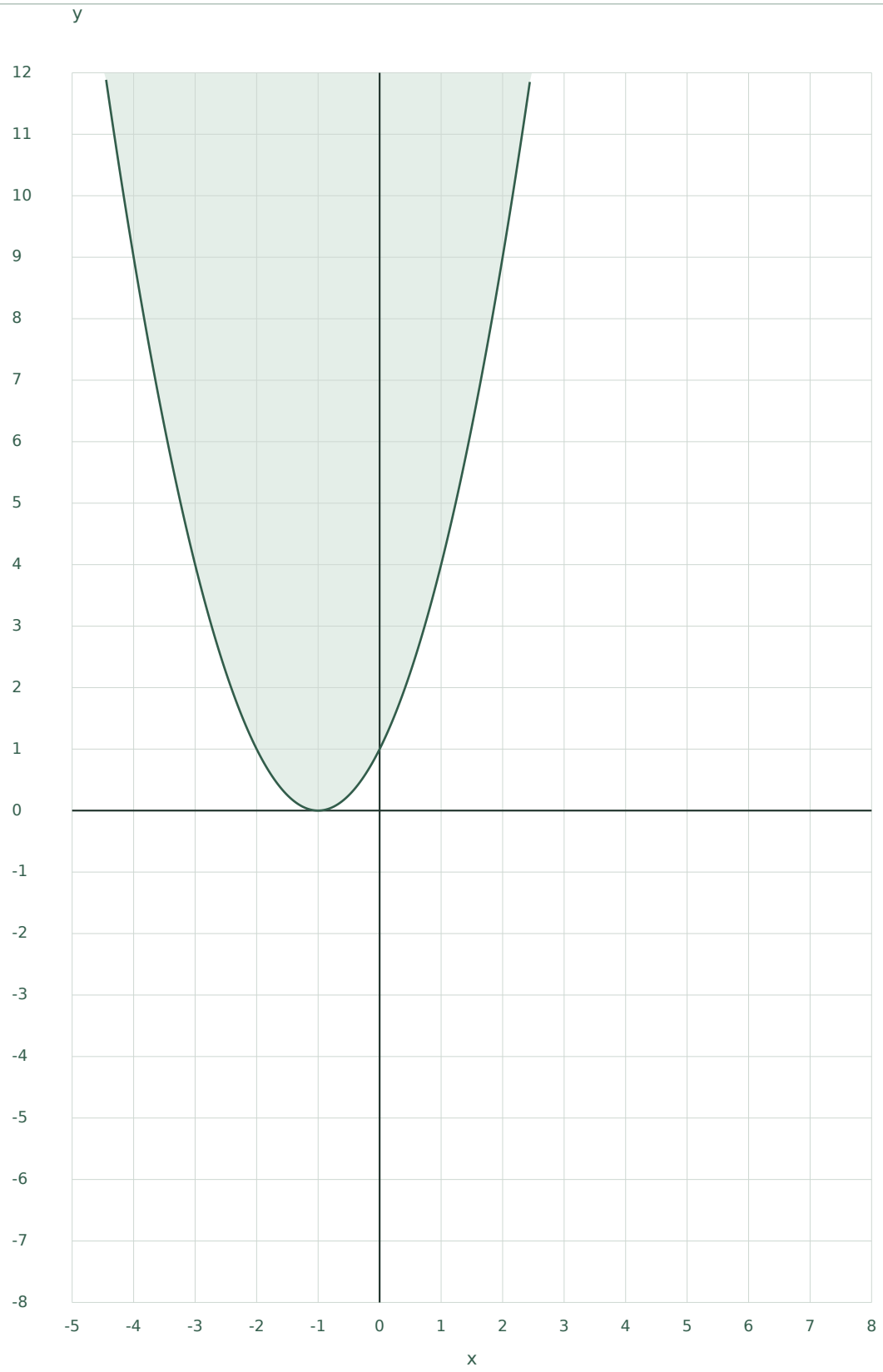
Task 2 / complete graph key



The shaded region is on the requested side of the parabola. Strict comparisons use a dashed boundary.

Graph Quadratic Inequalities: Shade the Solution Region

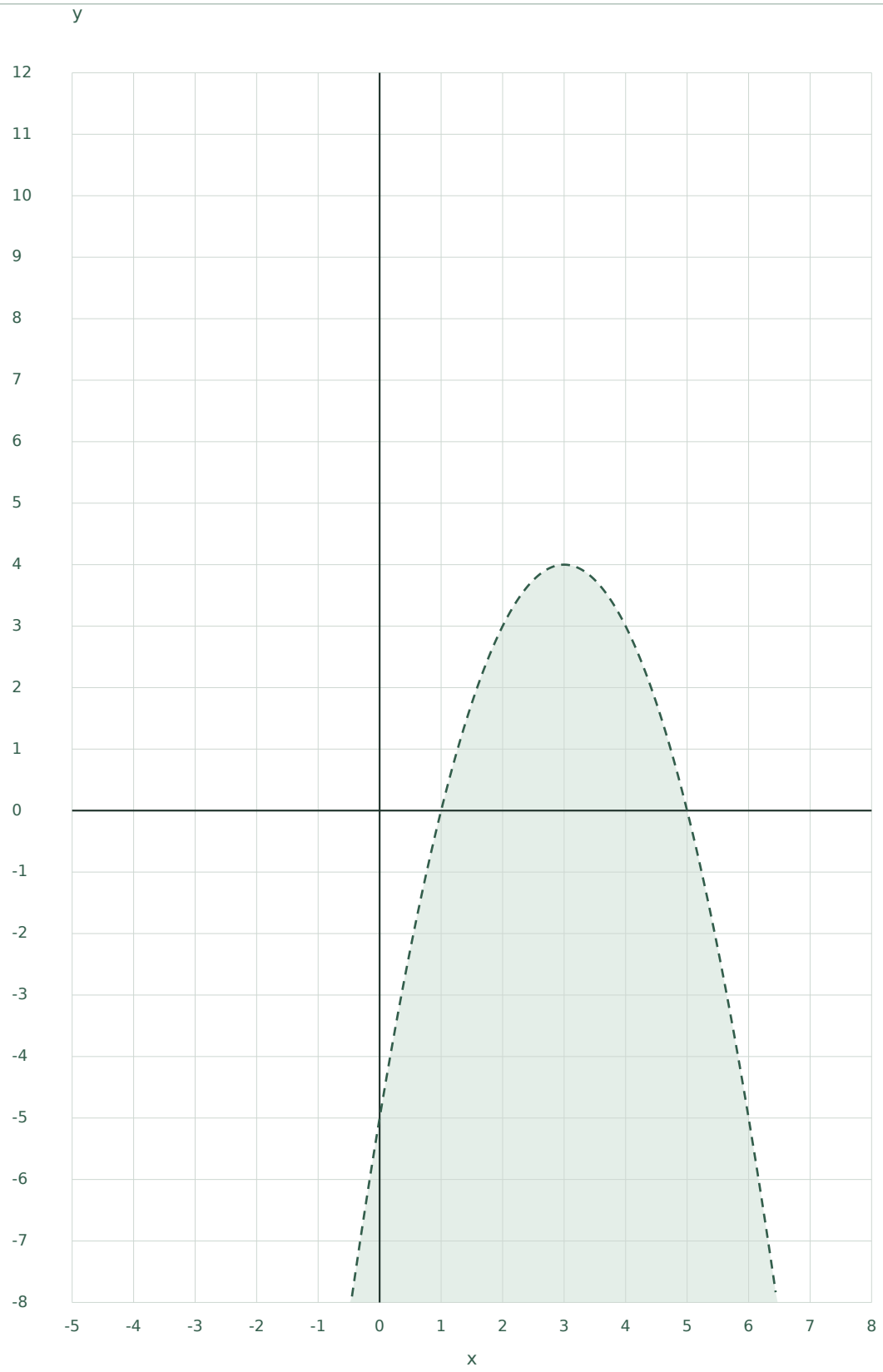
Task 3 / complete graph key



The shaded region is on the requested side of the parabola. Strict comparisons use a dashed boundary.

Graph Quadratic Inequalities: Shade the Solution Region

Task 4 / complete graph key



The shaded region is on the requested side of the parabola. Strict comparisons use a dashed boundary.

Graph Quadratic Inequalities: Shade the Solution Region

Source rubric / reflection

- [ ] Correctly identifies vertex and at least one intercept.
- [ ] Uses dashed boundary for strict inequality or solid for non-strict.
- [ ] Chooses a valid test point and substitutes correctly.
- [ ] Shades the correct region based on test-point result.
- [ ] Labels axes and boundary clearly; valid alternative sketches accepted if key features and shading are correct.

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