

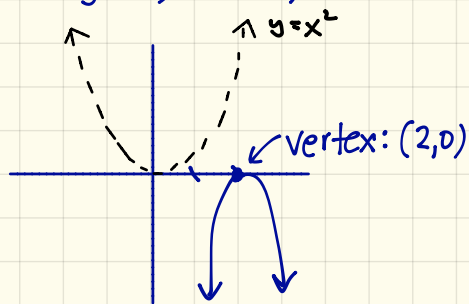
1.13 Characteristics of Quadratics

Domain, Range, Zeros, Y-intercepts, Extrema, Interval of Increase, Interval of Decrease, Axis of Symmetry, Vertex

old Transformations of Quadratics

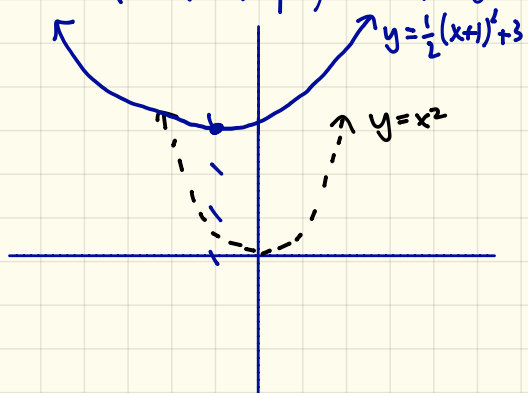
① $f(x) = -3(x-2)^2$

shift right 2, stretch, \downarrow



② $f(x) = \frac{1}{2}(x+1)^2 + 3$

Shift left 1, up 3, shrink \uparrow

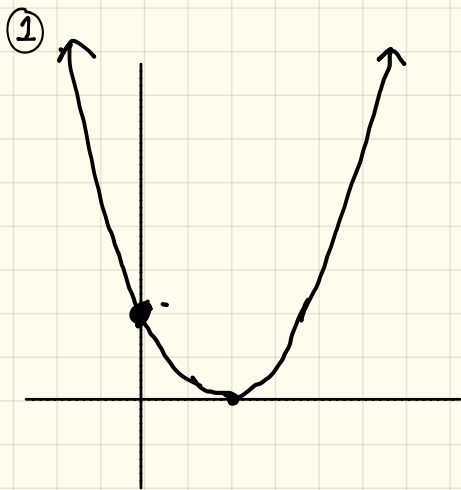


new Characteristics of Quadratics

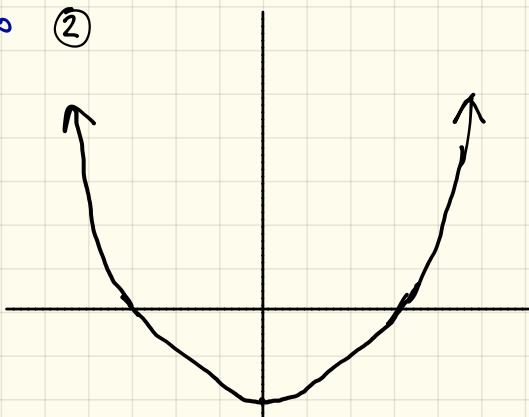
- Domain: the set of x -values (how far left to right the graph spans)
- Range: the set of y -values (how far down to up the graph spans)
- Zeros: the x -intercept(s) of the graph (also called roots or solutions)
- y -intercept: the point where the graph crosses the y -axis
- Extrema: the maximum or minimum point, \leftarrow maximum \leftarrow minimum
- Interval of Increase: the set of x -values where the slopes are positive. \uparrow
- Interval of Decrease: the set of x -values where the slopes are negative \uparrow
- Axis of Symmetry: the line where the parabola is symmetric
- Vertex: the maximum or minimum point

[Examples] Answer each using the graph.

- 1a) Domain: $(-\infty, \infty)$ or \mathbb{R} or $-\infty < x < \infty$
- 1b) Range: $[0, \infty)$ or $y \geq 0$
- 1c) Zeros: $(2, 0)$
- 1d) y-intercept: $(0, 2)$
- 1e) Extrema: $(2, 0) \leftarrow$ Minimum
- 1f) Interval of Increase: $(2, \infty)$
- 1g) Interval of Decrease: $(-\infty, 2)$
- 1h) Axis of Symmetry: $x = 2$
- 1i) Vertex: $(2, 0)$



- 2a) Domain: $(-\infty, \infty)$ or \mathbb{R} or $-\infty < x < \infty$
- 2b) Range: $[-2, \infty)$ or $y \geq -2$
- 2c) Zeros: $(-3, 0), (3, 0)$
- 2d) y-intercept: $(0, -2)$
- 2e) Extrema: $(0, -2)$
- 2f) Interval of Increase: $[0, \infty)$
- 2g) Interval of Decrease: $(-\infty, 0]$
- 2h) Axis of Symmetry: $x = 0$
- 2i) Vertex: $(0, -2)$



- 1a) Domain: $(-\infty, \infty)$ or \mathbb{R} or $-\infty < x < \infty$
- 1b) Range: $(-\infty, 2]$
- 1c) Zeros: $(-3, 0), (-1, 0)$
- 1d) y-intercept: $(0, -4)$
- 1e) Extrema: $(-2, 2)$
- 1f) Interval of Increase: $(-\infty, -2)$
- 1g) Interval of Decrease: $(-2, \infty)$
- 1h) Axis of Symmetry: $x = -2$
- 1i) Vertex: $(-2, 2)$

