Pre-Calculus 40S
Pre-requisite Skills Transformation

1. For each function, identify the following:

- the vertex
- whether the vertex is a maximum or minimum value
- the axis of symmetry
- the direction of opening
- the domain and range

a) $f(x) = (x - 3)^2 + 4$

b) $f(x) = \frac{1}{2}(x+5)^2 - 7$

c) $f(x) = -3x^2 + 15$

d) $f(x) = -\frac{1}{3}x^2 + \frac{1}{3}x - 2$

2. Write each function in vertex form.

Graph each quadratic function. Label the vertex and x-intercepts (if any exist), rounded to the nearest tenth of a unit.

a) $y = x^2 - 24x + 10$

b) $y = 5x^2 + 40x - 27$

c) $y = -2x^2 + 8x$

d) $y = -30x^2 - 60x + 105$

3. Graph.

a) $y = |3x + 4|$

b) $y = |x_2 - 5|$

c) $y = |2x_2 - x - 1|$

d) $y = \left| -\frac{1}{2}x - 3 \right|$

4. Graph the reciprocal of each function.

Identify any vertical asymptotes and non-permissible values.

a) $f(x) = 4x - 7$

b) $f(x) = -2x + 5$

c) $f(x) = x^2 - 16$

d) $f(x) = x^2 - x - 6$

Answers

1.

a) vertex (3, 4), minimum; axis of symmetry $x = 3$; opens upward; domain $\{x \mid x \in \mathrm{R}\}$; range $\{y \mid y \geq 4, y \in \mathrm{R}\}$

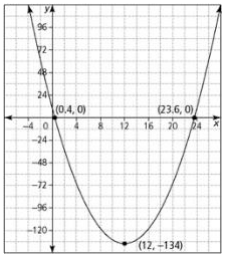
b) vertex (–5,–7), minimum; axis of symmetry $x = -5$; opens upward; domain $\{x \mid x \in \mathrm{R}\}$; range $\{y \mid y \geq -7, y \in \mathrm{R}\}$

c) vertex (0, 15), maximum; axis of symmetry $x = 0$; opens downward; domain $\{x \mid x \in \mathrm{R}\}$; range $\{y \mid y \leq 15, y \in \mathrm{R}\}$

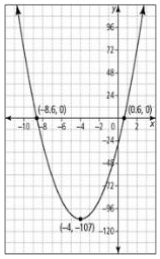
d) vertex $\left(-\frac{1}{2}, -\frac{23}{13}\right)$, maximum; axis of symmetry $x = \frac{1}{2}$;opens downward; domain $\{x \mid x \in \mathrm{R}\}$; range $\left\{y \mid y \leq \frac{-23}{12}, y \in \mathrm{R}\right\}$

2.

a) $y = (x - 12)^2 - 134$

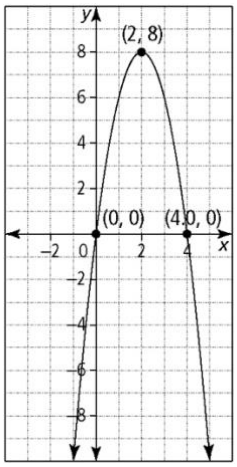


b) $y = 5(x + 4)^2 - 107$

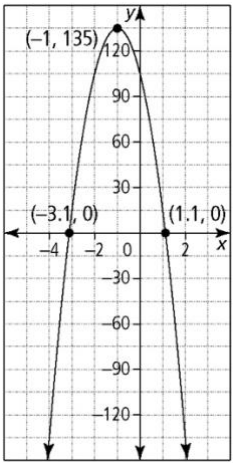


2.

c) $y = -2(x - 2)^2 + 8$

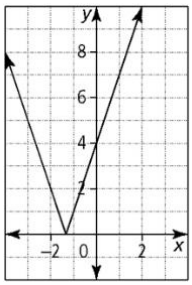


d) $y = -30(x + 1)^2 + 135$

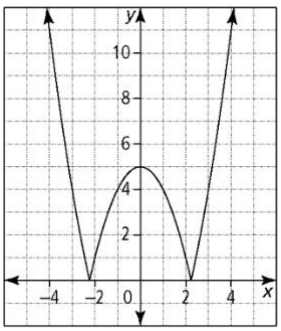


3.

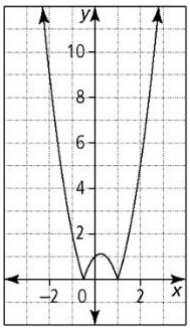
a.



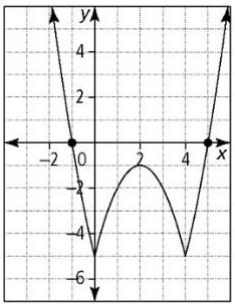
b.



c.

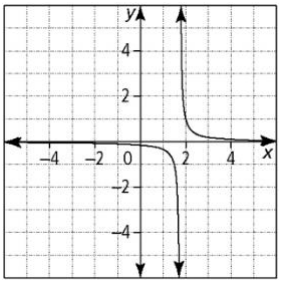


d.



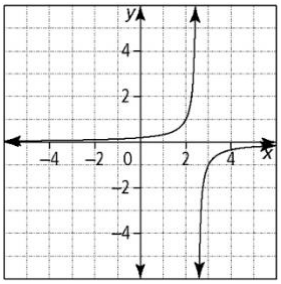
4.

a.



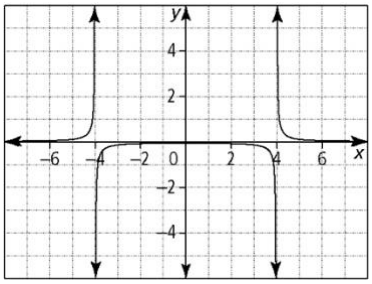
asymptote at $x = \frac{7}{4}$; $x \neq \frac{7}{4}$

b.



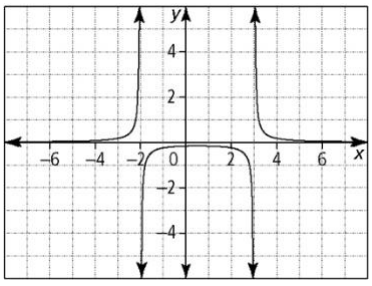
asymptote at $x = \frac{5}{2}$; $x \neq \frac{5}{2}$

c.



asymptotes at $x = 4, -4$; $x \neq \pm 4$

d.



asymptotes at $x = 3, -2$; $x \neq 3, -2$