

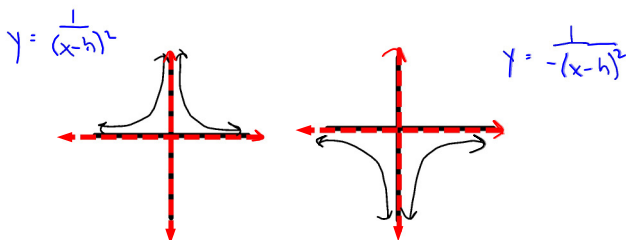
Lesson 4 Graphing Reciprocals of Quadratic Functions

When we graph the reciprocal of a quadratic function, the quadratic function may have 0, 1, or 2 vertical asymptotes.

There are 3 basic shapes

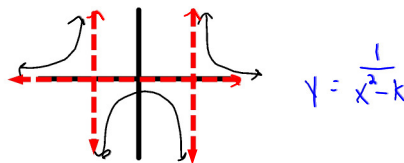
Shape 1 – Funnel or Inverted Funnel

- This shape has one vertical asymptote



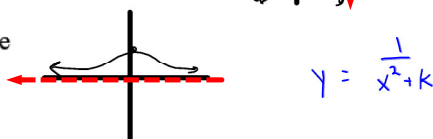
Shape 2 – H-Shape

- This shape has two vertical asymptotes



Shape 3 – The Speed Bump or Pot Hole

- This shape has no vertical asymptote



Examples

Funnel or Inverted Funnel (One Vertical Asymptote)

1. Sketch $y = \frac{1}{(x-1)^2}$.

Step 1: Sketch the graph $y = (x-1)^2$

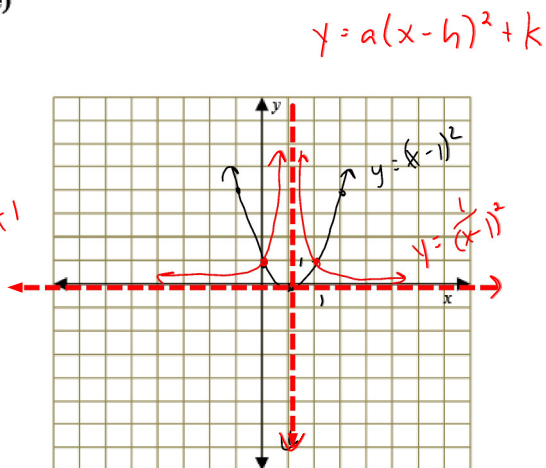
parabola moved right 1

Step 2: Sketch vertical asymptotes at the x -intercepts. ie. at the restrictions on the denominator.

Note: the horizontal asymptote is the x -axis since reciprocals of positive values will be positive and reciprocals of negative values will be negative.

Step 3: Plot the invariant points. Where $y = \pm 1$

Step 4: Sketch the graph, approaching the asymptotes



$D: x \neq 1$ or $(-\infty, 1) \cup (1, \infty)$
 $R: y > 0$ or $(0, \infty)$

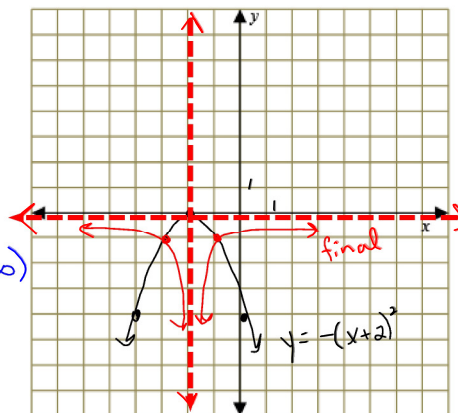
AR L4 Graphing Reciprocals of Quadratic Functions.notebook

Pre-Calculus 11 Enriched Absolute Value & Reciprocal Functions

2. Sketch $y = \frac{1}{-(x+2)^2}$.

sketch $y = -(x+2)^2$
 reflected
 or
 x-axis
 left 2

D: $x \neq -2$ or $(-\infty, -2) \cup (-2, \infty)$
 R: $y < 0$ or $(-\infty, 0)$



H-Shape (Two Vertical Asymptotes)

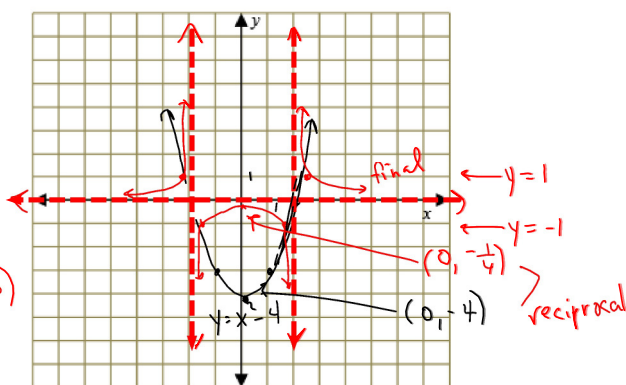
Steps:

1. Sketch the quadratic function
2. Sketch vertical asymptotes through the x-intercepts
3. Plot the invariant points
4. Plot the reciprocal of the main points.
5. Sketch the graph.
6. Remember to erase the original graph or clearly label

3. Sketch $y = \frac{1}{x^2-4}$

Sketch $y = x^2 - 4$

D: $x \neq \pm 2$
 * R: $(-\infty, -\frac{1}{4}] \cup (0, \infty)$
 reciprocal
 of
 min @ -4



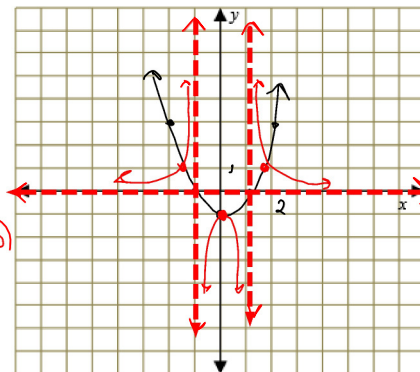
AR L4 Graphing Reciprocals of Quadratic Functions.notebook

Pre-Calculus 11 Enriched Absolute Value & Reciprocal Functions

4. Sketch $y = \frac{1}{(x-1)(x+1)}$

$y = (x-1)(x+1)$
 $y = x^2 - 1$

$D: x \neq \pm 1$
 $R: (-\infty, -1] \cup (0, \infty)$

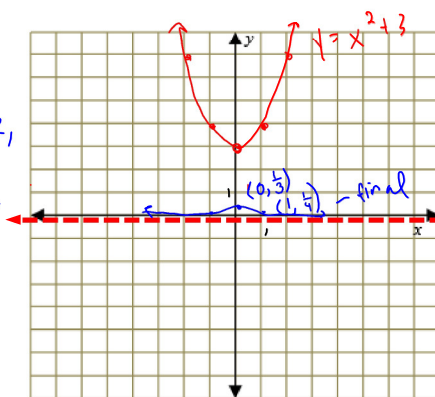


Speed Bump or Pot Hole (No Vertical Asymptote)

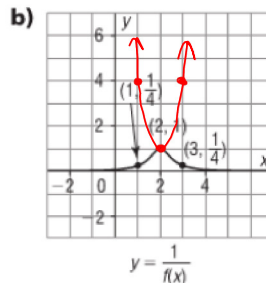
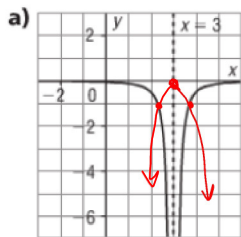
5. Sketch $y = \frac{1}{x^2+3}$

$y = x^2 + 3$ — all y -values are +ve,
 \therefore all reciprocal values are +ve
 no x -int(s) \therefore no V.A.
 no invariant pts

$D: (-\infty, \infty)$
 $R: (0, \frac{1}{3}]$



Given the graph of each reciprocal function $y = \frac{1}{f(x)}$, sketch $y = f(x)$.



Assign 5

Review

pg. 214
 5-8 Absolute Value
 Reciprocal Fcn review