

3.1/3.2 Reciprocal of Linear and Quadratic Functions Worksheet with solutions

This document was composed and formatted by Annie Bernatchez.

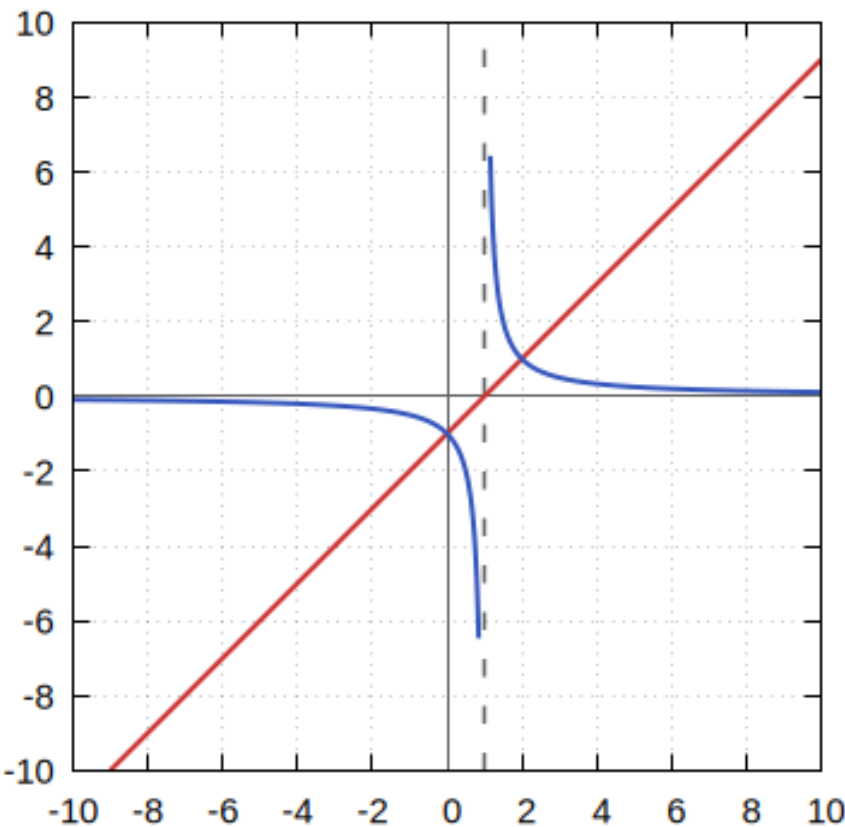
The course material originated from www.jensenmath.ca

1) Graph each of the following reciprocal functions. Start by graphing the function in the denominator. Show as much characteristic information about the graph as you can (e.g. intercepts, asymptotes with equations, other defining points, etc).

a) $f(x) = \frac{1}{x-1}$

$y = x - 1$. HA : $y = 0$, VA : $x = 1$

x	$y = x - 1$	$f(x) = \frac{1}{x-1}$
-2	-3	-0.33
-1	-2	-0.5
0	-1	-1
1	0	undefined
2	1	1
3	2	0.5
4	3	0.33

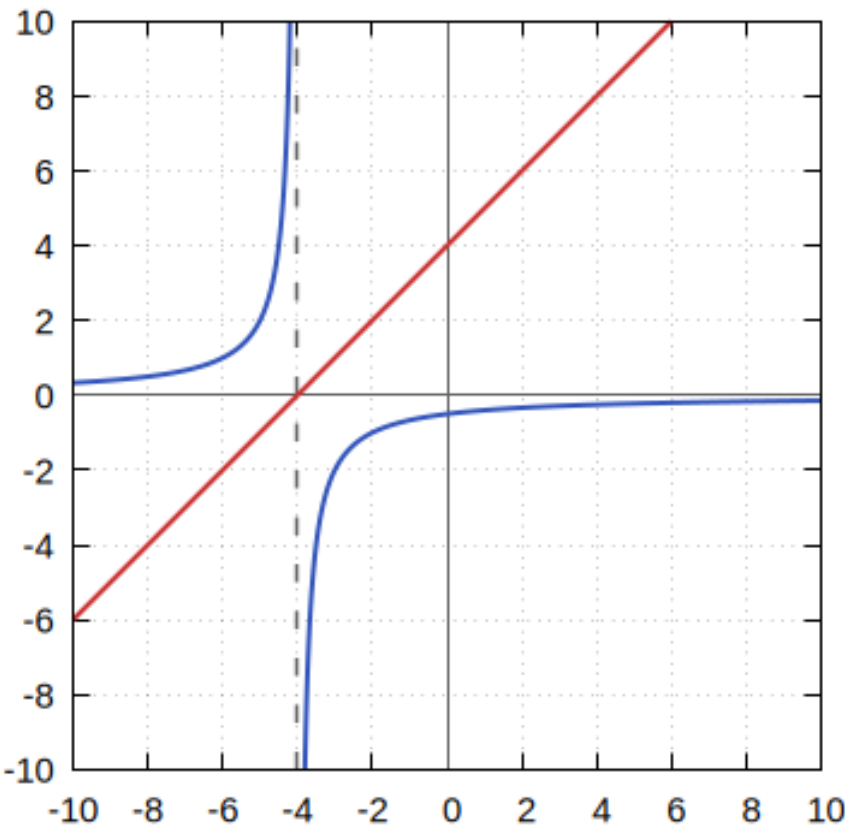


b) $g(x) = -\frac{2}{x+4}$

$y = x + 4$. HA : $y = 0$, VA : $x = -4$

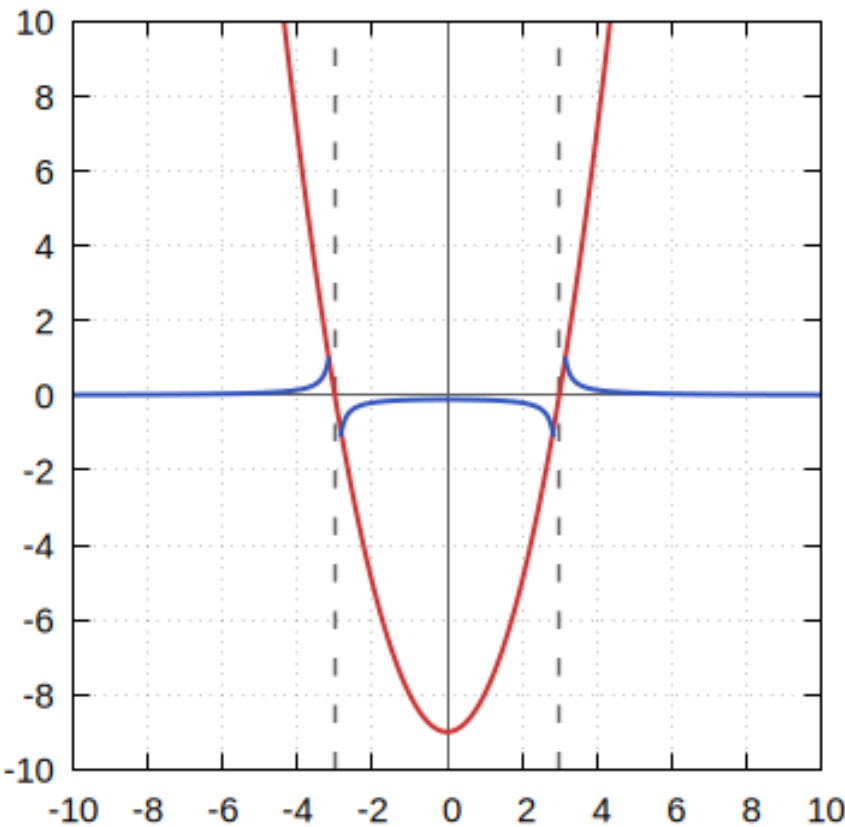
x	$y = x + 4$	$g(x) = -\frac{2}{x+4}$
-7	-3	0.67
-6	-2	1
-5	-1	2

-4	0	undefined
-3	1	-2
-2	2	-1
-1	3	-0.67



c) $h(x) = \frac{1}{x^2 - 9}$
 $y = x^2 - 9 = (x - 3)(x + 3)$. $HA : y = 0$, $VA : x = 3$ and $x = -3$

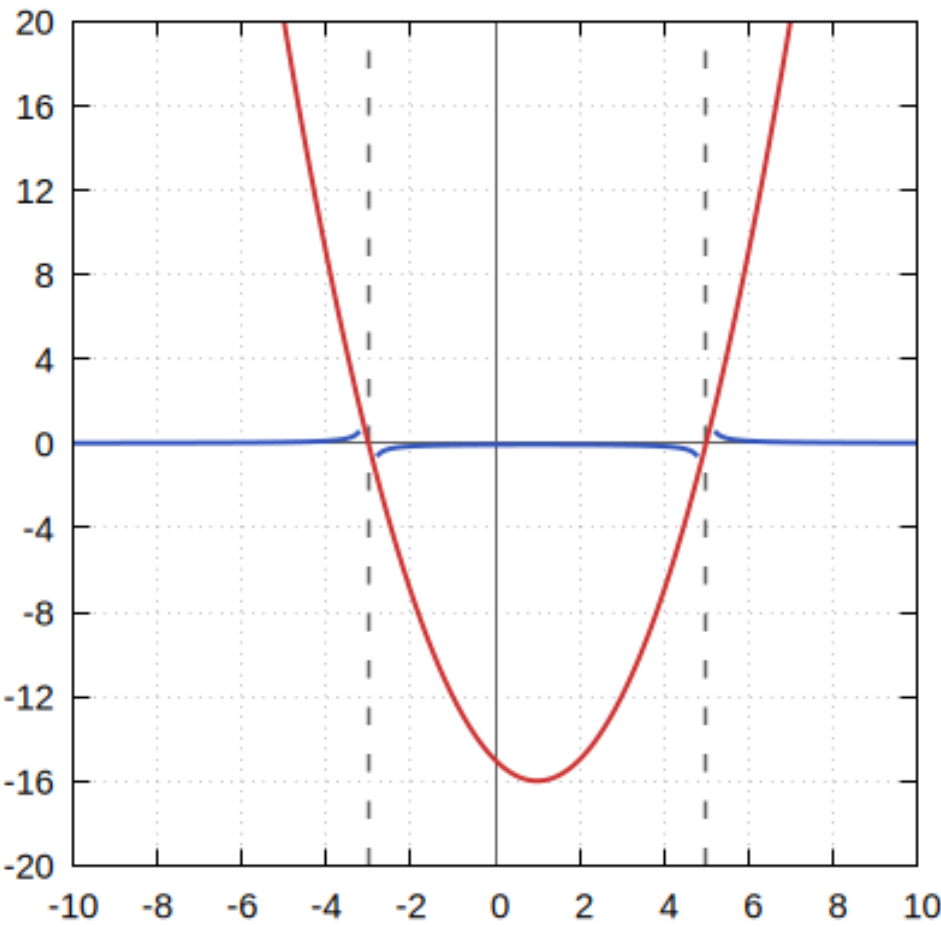
x	$y = x^2 - 9$	$h(x) = \frac{1}{x^2 - 9}$
-4	7	0.14
-3	0	undefined
-1	-8	-0.125
0	-9	-0.11
1	-8	-0.125
3	0	undefined
4	7	0.14



d) $j(x) = \frac{1}{x^2 - 2x - 15}$

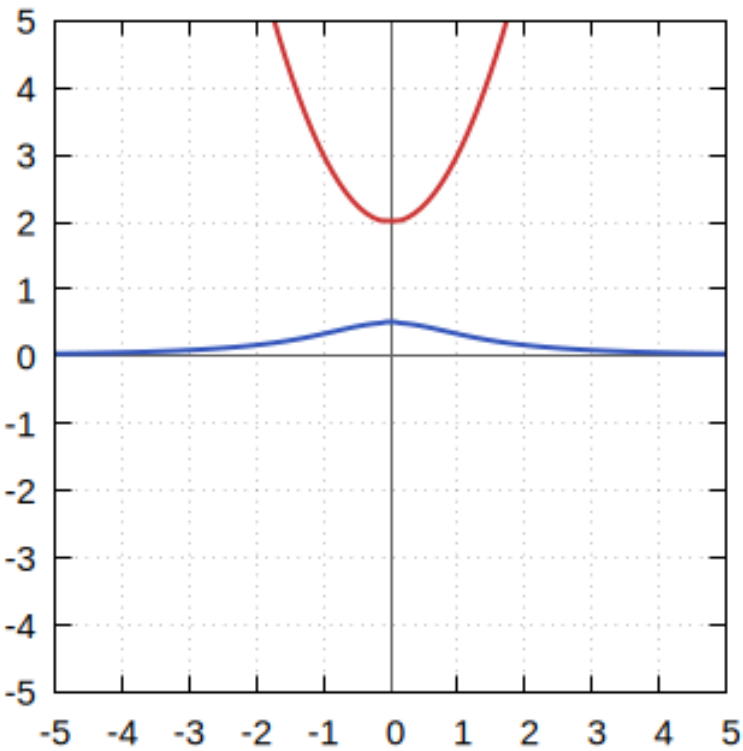
$y = x^2 - 2x - 15 = (x - 5)(x + 3)$. x -vertex = $-\frac{b}{2a} = -\frac{-2}{2(1)} = 1$. $HA : y = 0$, $VA : x = 5$ and $x = -3$

x	$y = x^2 - 2x - 15$	$j(x) = \frac{1}{x^2 - 2x - 15}$
-4	9	0.11
-3	0	undefined
0	-15	-0.07
1	-16	-0.06
2	-15	-0.07
5	0	undefined
6	9	0.11



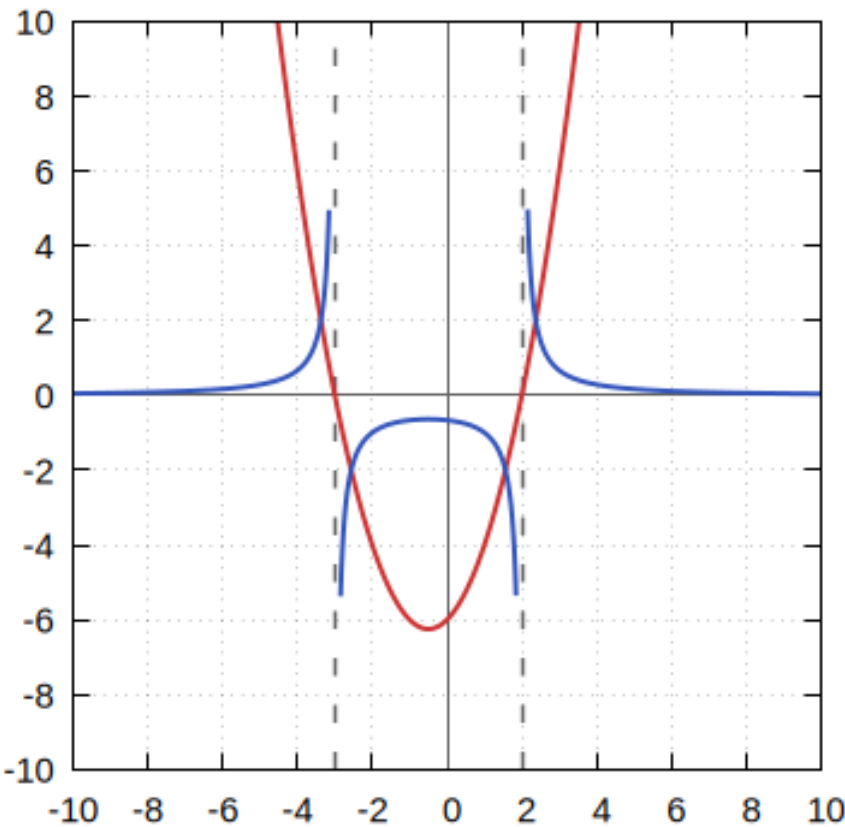
e) $k(x) = \frac{1}{x^2 + 2}$
 $y = x^2 + 2$, vertex (0, 2). Since $x^2 + 2 \neq 0$ for any real x , VA : none. HA : $y = 0$

x	$y = x^2 + 2$	$k(x) = \frac{1}{x^2 + 2}$
-3	11	0.1
-2	6	0.17
-1	3	0.33
0	2	0.5
1	3	0.33
2	6	0.17
3	11	0.1



f) $m(x) = \frac{4}{x^2 + x - 6}$
 $y = x^2 + x - 6 = (x + 3)(x - 2)$. x -vertex = $-\frac{b}{2a} = -\frac{1}{2(1)} = -0.5$. $HA : y = 0$, $VA : x = -3$ and $x = 2$

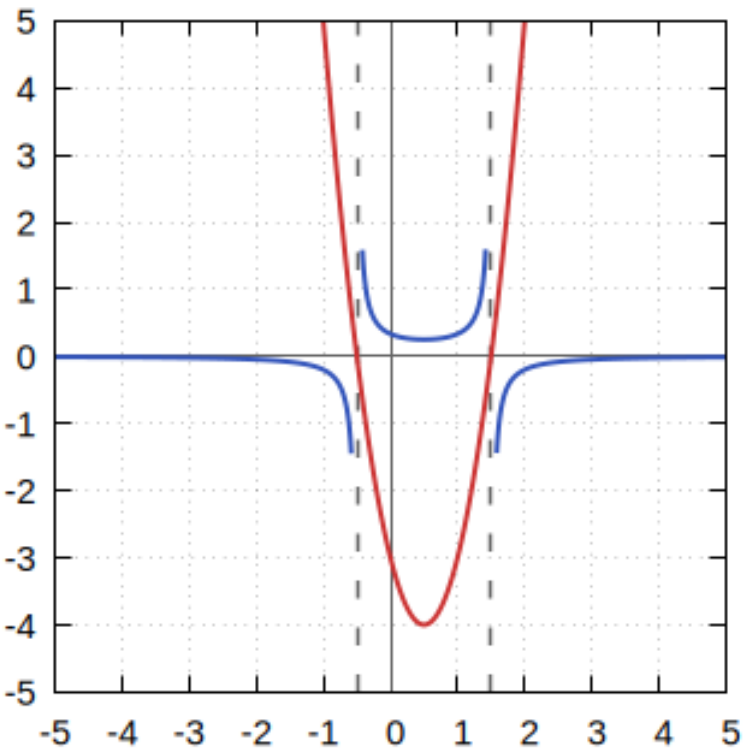
x	$y = x^2 + x - 6$	$m(x) = \frac{4}{x^2 + x - 6}$
-4	6	0.67
-3	0	undefined
-1	-6	-0.67
-0.5	-6.25	-0.64
0	-6	-0.67
2	0	undefined
3	6	0.67



g) $n(x) = -\frac{1}{4x^2 - 4x - 3}$

$y = 4x^2 - 4x - 3 = (2x - 3)(2x + 1)$. x -vertex = $-\frac{b}{2a} = \frac{4}{2(4)} = 0.5$. $HA : y = 0$, $VA : x = 1.5$ and $x = -0.5$

x	$y = 4x^2 - 4x - 3$	$n(x) = -\frac{1}{4x^2 - 4x - 3}$
-1	5	-0.2
-0.5	0	undefined
0	-3	0.33
0.5	-4	0.25
1	-3	0.33
1.5	0	undefined
2	5	-0.2



h) $p(x) = \frac{4}{2x^2 - 8x + 9}$

$y = 2x^2 - 8x + 9$, vertex at $x = -\frac{b}{2a} = \frac{8}{2(2)} = 2$. Discriminant $b^2 - 4ac = (-8)^2 - 4(2)(9) = -8$, so VA : none. HA : $y = 0$

x	$y = 2x^2 - 8x + 9$	$p(x) = \frac{4}{2x^2 - 8x + 9}$
-1	19	0.21
0	9	0.44
1	3	1.33
2	1	4
3	3	1.33
4	9	0.44
5	19	0.21

