

### SM3H 3.3 odd answers and #22 not #23

1. proper

3. false

5.  $(-\infty, 3) \cup (3, \infty)$

7.  $(-\infty, -1/2) \cup (-1/2, 3) \cup (3, \infty)$

9.  $(-\infty, \infty)$

11. a) domain:  $(-\infty, 2) \cup (2, \infty)$  range:  $(-\infty, 1) \cup (1, \infty)$  b) (0,0) c)  $y = 1$  d)  $x = 2$  e) none

13. a) domain:  $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$  range:  $(-\infty, 0] \cup (1, \infty)$  b) (0,0) c)  $y = 1$  d)  $x = 2, x = -2$  e) none

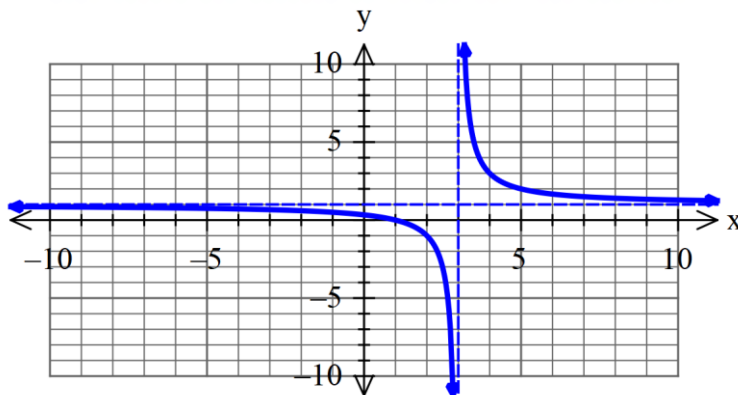
15. parent graph:  $y = \frac{1}{x}$  transformations: vertical stretch by 2, translate right 3, up 1

Parent table:

x	y
-2	-1/2
-1	-1
0	undef
1	1
2	1/2
3	1/3

table for  $G(x) = 1 + \frac{2}{x-3}$ :

X+3	2y+1
1	0
2	-1
3	Undef
4	3
5	2
6	5/3



17. VA:  $x = 3$  oblique:  $y = x + 5$

19. VA:  $x = -1/3$ , HA:  $y = 2/3$

21. VA:  $x = 0$ , End behavior asympt.:  $y = x^2 + x + 1$

22. Domain:  $(-\infty, -3) \cup (-3, 4) \cup (4, \infty)$   
 Range:  $(-\infty, -5] \cup (-3, \infty)$   
 $x$ -intercept(s):  $(-3.9, 0), (5.1, 0)$   
 $y$ -intercept:  $(0, -5)$   
 Increasing:  $(-\infty, -3) \cup (-3, 0)$   
 Decreasing:  $(0, 4) \cup (4, \infty)$   
 Constant: N/A

Vertical Asymptote(s):

$$x = -3, x = 4$$

Positive:  $(-3.9, -3) \cup (4, 5.1)$   
 Negative:  $(-\infty, -3.9) \cup (-3, 4) \cup (5.1, \infty)$   
 Maximums / minimums:  $(0, -5)$

Symmetry: none

End Behavior/Limits:

$$\lim_{x \rightarrow -\infty} f(x) = -3 \quad \lim_{x \rightarrow \infty} f(x) = -3$$

$$\lim_{x \rightarrow -3^-} f(x) = \infty \quad \lim_{x \rightarrow -3^+} f(x) = -\infty$$

$$\lim_{x \rightarrow 4^-} f(x) = -\infty \quad \lim_{x \rightarrow 4^+} f(x) = \infty$$

Horizontal Asymptote:

$$y = -3$$

25a. no

25b.  $(-2, 2)$

25c.  $(-1, -2), \left(-\frac{2}{3}, -2\right)$

25d.  $(-\infty, \infty)$

25e.  $(0, 0), \left(-\frac{5}{3}, 0\right)$

25f.  $(0, 0)$

27.  $\frac{(x-2)(3x+2)}{(x+1)(2x+1)}$