Name _____ 9.3 Practice (pg 495)

Find any points of discontinuity for each rational function.

1) $y = \frac{2x^2+5}{x^2-2x} = \frac{2x^2+5}{x(x-2)}$

VA: $x = 0$, $x = 2$

2) $y = \frac{x^2+2x}{x^2+2} = \frac{x(x+2)}{x^2+2}$

No discontinuities

$(x^2+2 \neq 0)$

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

Hole at $(1, \frac{3}{2})$

VA: $x = -1$

6) $y = \frac{x^2+4x+3}{2x^2+5x-7}$

$= \frac{(x+3)(x+1)}{(2x+7)(x-1)}$

VA: $x = \frac{-7}{2}$, $x = 1$

7) $y = \frac{x^3-8}{x^3-8} = 1$

Hole at $(2, 1)$

8) $y = \frac{1}{2x^2+3x-7}$

VA: $x = \frac{-3+\sqrt{65}}{4}$, $x = \frac{-3-\sqrt{65}}{4}$

13) $y = \frac{(x+3)(x-2)}{(x-2)(x+1)}$

Hole at $(2, \frac{5}{3})$

VA: $x = -1$

15) $y = \frac{x+5}{x^2+9}$

no discontinuities

$(x^2+9 \neq 0)$

16) $y = \frac{9-x^2}{x^2-9} = \frac{(3+x)(3-x)}{(x+3)(x-3)}$

$= -1$

Holes at: $(-3, -1)$ and $(3, -1)$

17) $y = \frac{2x^2}{2x^2+2}$

NO discontinuities

$(2x^2+2 \neq 0)$

18) $y = \frac{6x^2+x-2}{3x^2+17x+10}$

$\frac{(3x+2)(2x-1)}{(3x+2)(x+5)}$

Hole at $(\frac{-2}{3}, \frac{-7}{13})$

VA: $x = -5$

A. $y = \frac{(x-2)^3}{(x-2)^2} = x-2$

Hole at $(2, 0)$

End Behavior

Find the horizontal asymptote of the graph of each rational function.

19) $y = \frac{5}{x+6}$

$y = 0$

20) $y = \frac{x+2}{2x^2-4}$

$y = 0$

B. $y = \frac{x^3+2}{x^2-4}$

EBA: $y = x$ (Long Division)

21) $y = \dfrac{x+1}{x+5}$

$y = 1$

C. $y = \dfrac{3x^2+4x-1}{x-1}$

1 | 3 4 −1
↓ 3 7
3 7 6

EBA: $y = 3x+7$

D. $y = \dfrac{x^3+5x}{x+3}$

−3 | 1 0 5 0
↓ −3 9
1 −3 14

EBA: $x^2-3x+14 = y$

22) $y = \dfrac{x^2+2}{2x^2-1}$

$y = \frac{1}{2}$

23) $y = \dfrac{5x^3+2x}{2x^5-4x^3}$

$y = 0$

24) $y = \dfrac{3x-4}{4x+1}$

$y = \frac{3}{4}$

Sketch the graph of each rational function.

25) $y = \dfrac{x^2-4}{3x-6} = \dfrac{(x+2)(x-2)}{3(x-2)} = \frac{1}{3}(x+2) = \frac{1}{3}x + \frac{2}{3}$

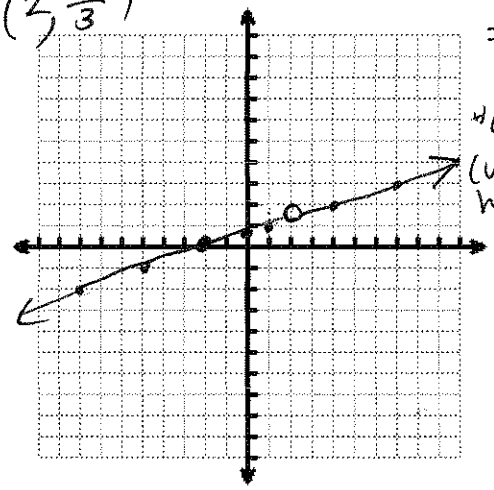
Hole: $(2, \frac{4}{3})$

y-int: $(0, \frac{2}{3})$

x-ints: $(-2, 0)$

no VA

a line! (with a hole in it)



26) $y = \dfrac{4x}{x^3-4x} = \dfrac{4x}{x(x^2-4)} = \dfrac{4x}{x(x+2)(x-2)}$

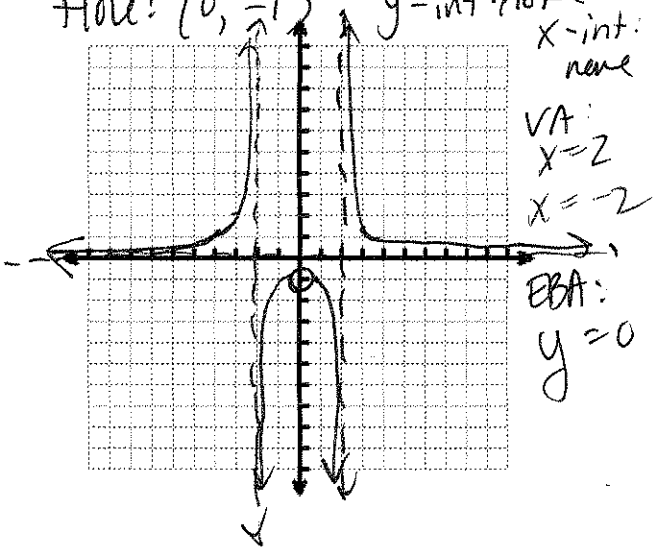
Hole: $(0, -1)$

y-int: none

x-int: none

VA: $x = 2$, $x = -2$

EBA: $y = 0$



27) $y = \dfrac{x+4}{x-4}$

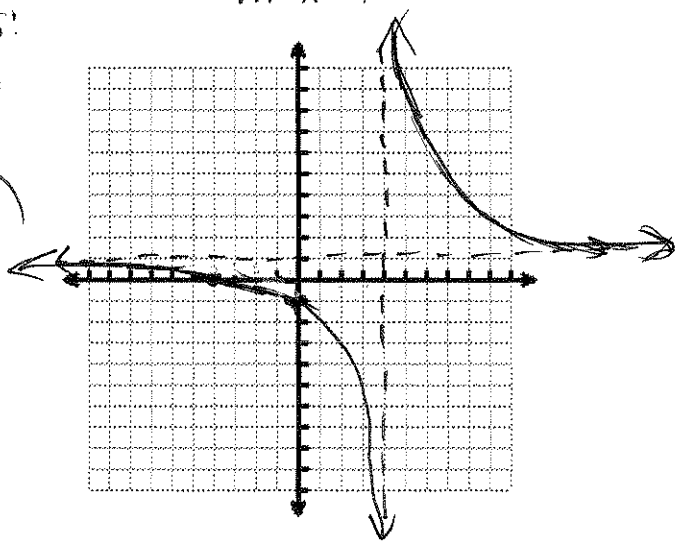
no holes

VA: $x = 4$

x-ints: $(-4, 0)$

y-int: $(0, -1)$

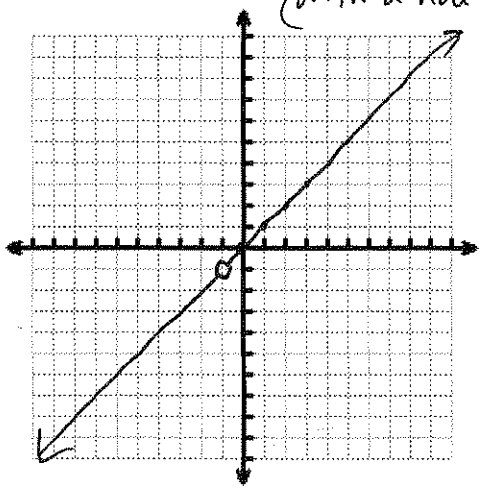
EBA: $y = 1$



28) $y = \dfrac{x(x+1)}{x+1} = x$

Hole: $(-1, -1)$

a line! (with a hole in it)



E. $y = \dfrac{5x+10}{x^2-x-6} = \dfrac{5(x+2)}{(x-3)(x+2)}$

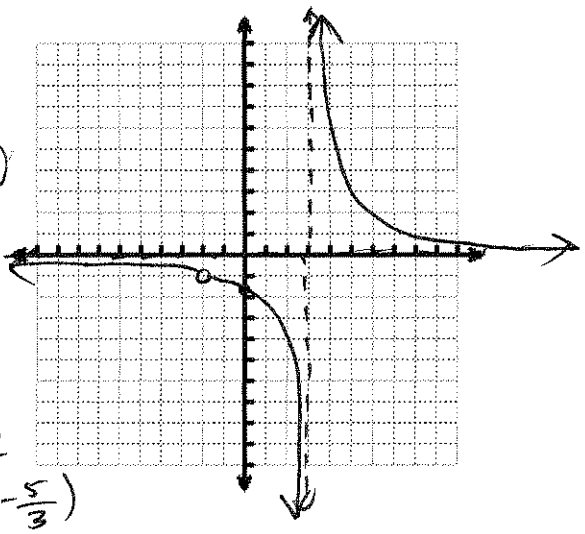
Hole: $(-2, -1)$

VA: $x = 3$

EBA: $y = 0$

x-int: none

y-int: $(0, -\frac{5}{3})$



29) $y = \dfrac{x+6}{(x-2)(x+3)}$

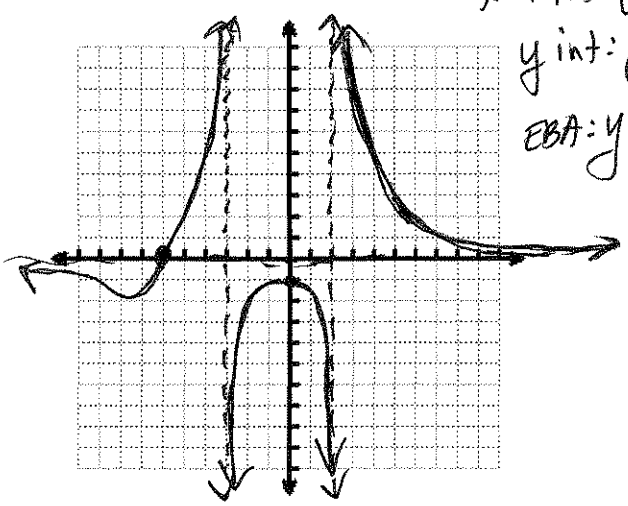
no holes

VA: $x = 2$ $x = -3$

x-ints: $(-6, 0)$

y-int: $(0, -1)$

EBA: $y = 0$



30) $y = \dfrac{3x}{(x+2)^2}$

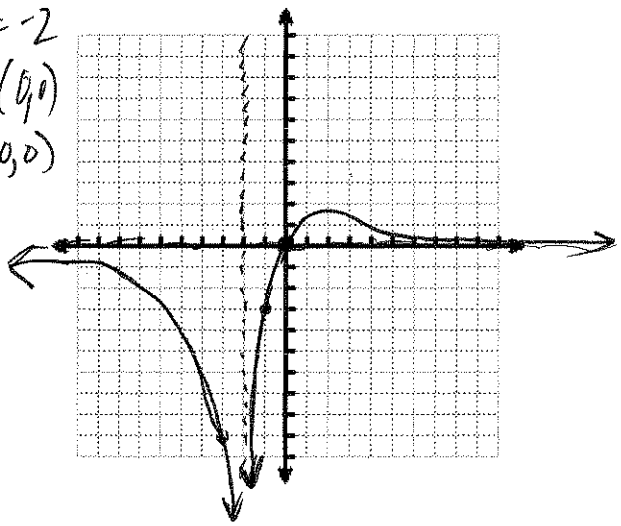
VA: $x = -2$

x-int: $(0, 0)$

y-int: $(0, 0)$

EBA: $y = 0$

x	y
-1	-3
-3	-9



F. $y = \dfrac{2x^2+5x+4}{x+1}$ ← has no real zeros

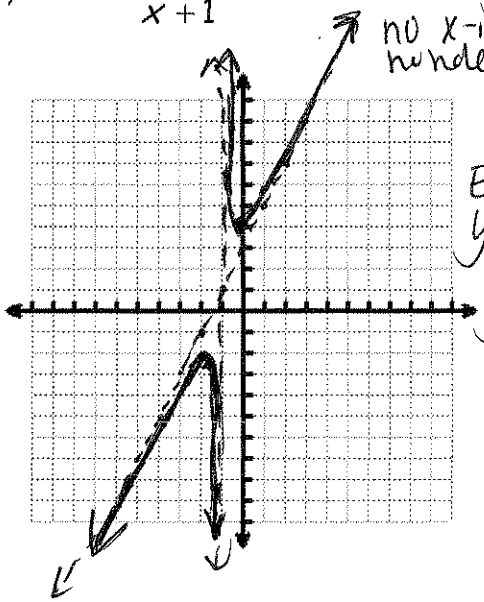
no x-ints

no holes

VA: $x = -1$

EBA: $y = 2x + 3$

y-int: $(0, 4)$



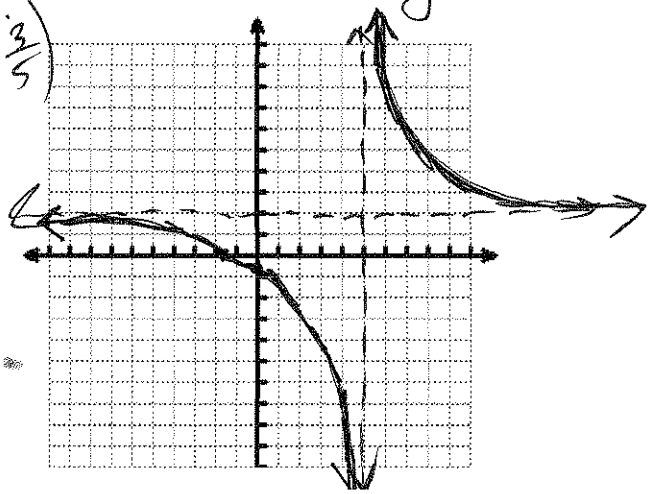
35) $y = \dfrac{2x+3}{x-5}$

VA: $x = 5$

EBA: $y = 2$

y-int: $(0, -\frac{3}{5})$

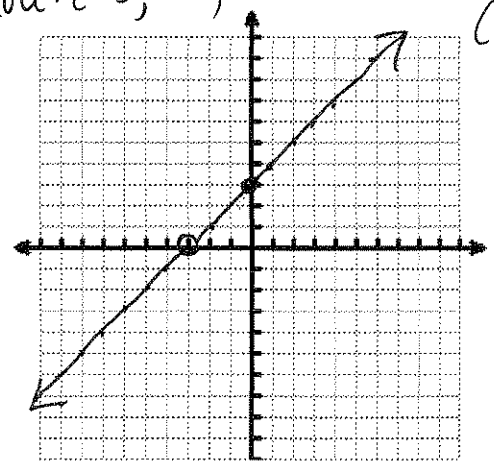
x-ints: $(-\frac{3}{2}, 0)$



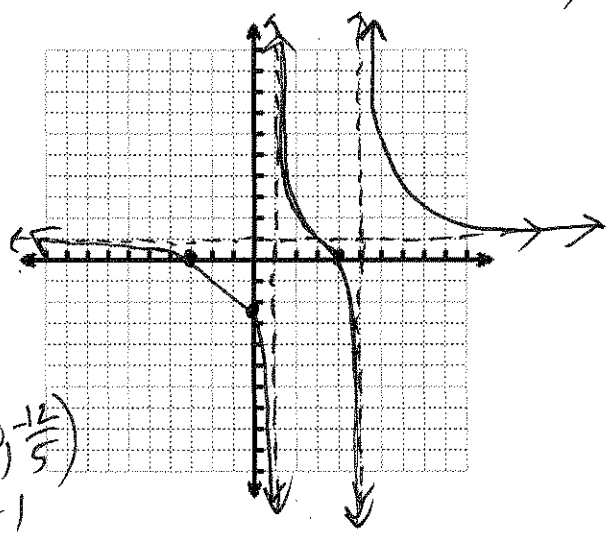
36) $y = \dfrac{x^2+6x+9}{x+3}$ $\dfrac{(x+3)(x+3)}{(x+3)} = x+3$

Hole: $(-3, 0)$

a line! (with a hole in it)



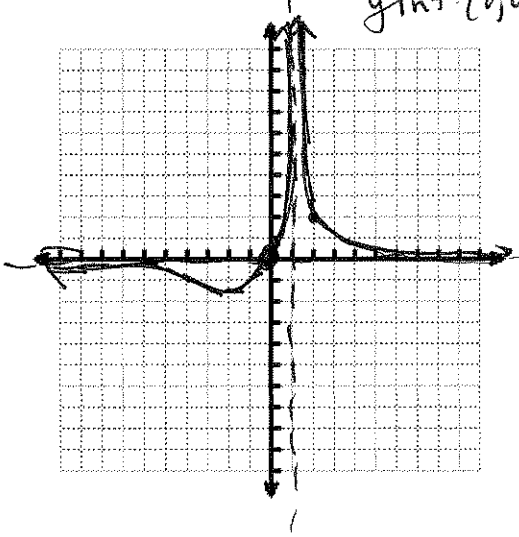
37) $y = \dfrac{x^2 - x - 12}{x^2 - 6x + 5} = \dfrac{(x-4)(x+3)}{(x-5)(x-1)}$



VA:
$x = 5$
$x = 1$
x-ints:
$(4, 0)$
$(-3, 0)$
y-int: $(0, \frac{-12}{5})$
EBA: $y = 1$

38) $y = \dfrac{x}{(x-1)^2}$

VA: $x = 1$
x-int: $(0, 0)$
y-int: $(0, 0)$

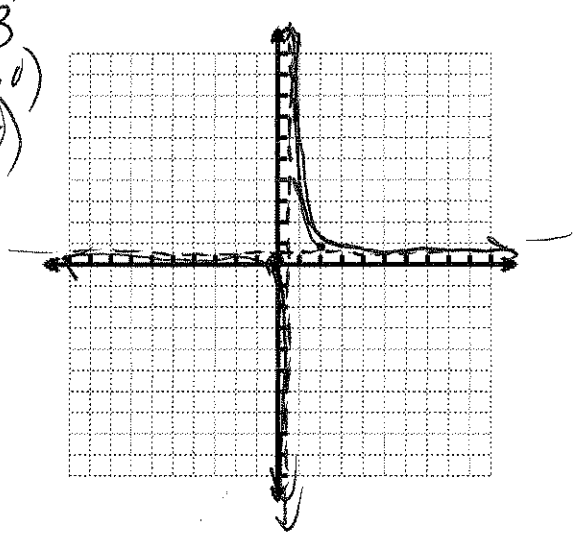


EBA:
$y = 0$

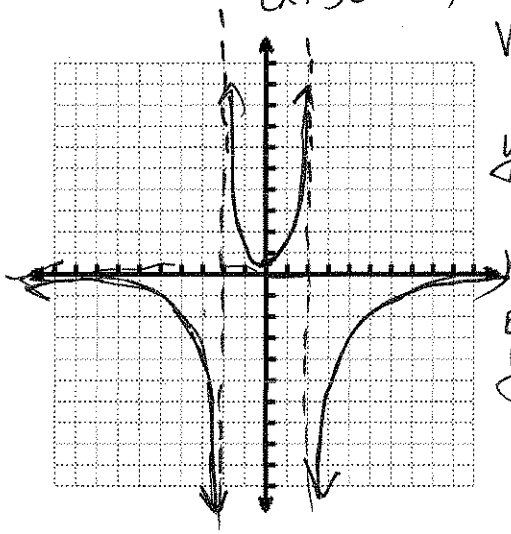
x	y
2	2

39) $y = \dfrac{2x}{3x - 1}$

VA: $x = \frac{1}{3}$
x-int: $(0, 0)$
y-int: $(0, 0)$
EBA:
$y = \frac{2}{3}$

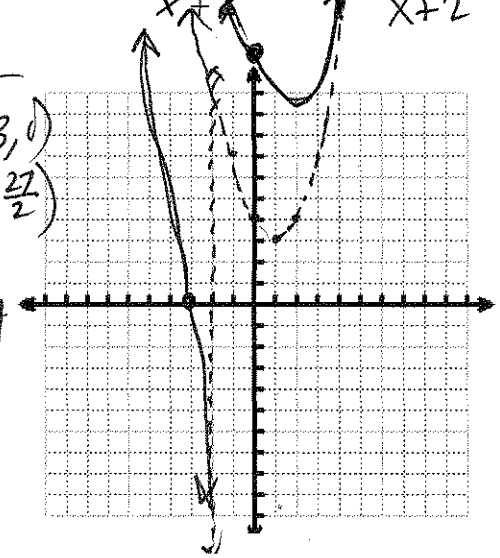


40) $y = \dfrac{-2}{x^2 - 4} = \dfrac{-2}{(x+2)(x-2)}$



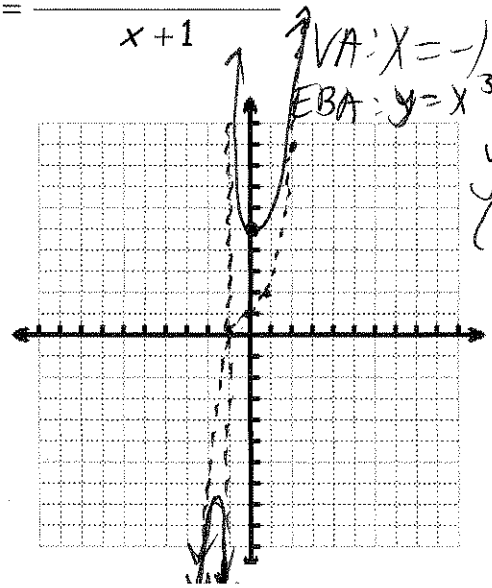
VA: $x = -2$
$x = 2$
y-int:
$(0, \frac{1}{2})$
no x-ints
EBA:
$y = 0$

G. $y = \dfrac{x^3 + 27}{x + 2} = \dfrac{(x+3)(x^2 - 3x + 9)}{x + 2}$



VA: $x = -2$
x-int: $(-3, 0)$
y-int: $(0, \frac{27}{2})$
EBA:
$y = x^2 - 2x + 4$

H. $y = \dfrac{5 + x + x^3 + x^4}{x + 1}$



VA: $x = -1$
EBA: $y = x^3 + 1$
y-int:
$(0, 5)$