

$$2. \frac{25-x^2}{x-5}$$

$$= \frac{(5-x)(5+x)}{x-5}$$

$$= -(5+x) = -5-x$$

$$4. \frac{x^2-x-20}{2x^2+7x-4}$$

[10]

-5/mistake

$$= \frac{(x-5)(x+4)}{(2x-1)(x+4)}$$

$$= \boxed{\frac{x-5}{2x-1}}$$

$$6. \frac{a+b}{ax^2+bx^2}$$

$$= \frac{a+b}{(a+b)x^2} = \frac{1}{x^2}$$

$$8. \frac{a^3b^2-27b^5}{(ab-3b^2)^2}$$

$$= \frac{b^2(a^3-27b^3)}{b^2(a-3b)^2}$$

$$= \frac{(a-3b)(a^2+3ab+9b^2)}{(a-3b)(a-3b)}$$

$$= \frac{a^2+3ab+9b^2}{a-3b}$$

$$\textcircled{10.} \quad \frac{(x-y)^2 (a+b)}{(x^2-y^2)(a^2+2ab+b^2)}$$

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

$$= \boxed{\frac{(x-y)}{(x+y)(a+b)}}$$

$\textcircled{[10]}$

-5/mistake

$$20. \quad \frac{1}{3x} + \frac{1}{5x^2} - \frac{1}{30x^3}$$

$$= \frac{10x^2 + 6x - 1}{30x^3}$$

$$22. \quad \frac{1}{a} + \frac{1}{b} + \frac{1}{c}$$

$$= \frac{bc+ac+ab}{abc}$$

$$24. \quad \frac{4}{x-4} - \frac{4}{x+1}$$

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

$$= \frac{4x+4 - 4x+16}{(x-4)(x+1)}$$

$$= \frac{20}{(x-4)(x+1)}$$

$$26. \quad 1 + \frac{1}{x} - \frac{1}{x^2}$$

$$= \frac{x^2 + x - 1}{x^2}$$

$$30. \quad \frac{x}{x+a} + \frac{a}{a-x}$$

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

$$= \frac{ax - x^2 + ax + a^2}{a^2 - x^2}$$

$$= \frac{2ax - x^2 + a^2}{a^2 - x^2}$$

$$\textcircled{32} \quad \frac{3}{2x+2} - \frac{5}{x^2-1} + \frac{1}{x+1}$$

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

$$= \frac{3x-3-10+2x-2}{2(x+1)(x-1)}$$

$$= \frac{5x-15}{2(x+1)(x-1)}$$

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

$\textcircled{[10]}$

-5/mistake

Both ok, also

$$\frac{5x-15}{2x^2-2} \quad \text{or} \quad \frac{5(x-3)}{2x^2-2}$$

$$40. \frac{\frac{1}{a} + \frac{1}{b}}{\frac{1}{a} - \frac{1}{b}}$$

$$= \frac{\frac{a+b}{ab}}{\frac{b-a}{ab}} = \frac{a+b}{b-a}$$

$$42. \frac{\frac{1}{x^2} - \frac{1}{y^2}}{\frac{1}{x} + \frac{1}{y}}$$

$$= \frac{\frac{y^2 - x^2}{x^2 y^2}}{\frac{x+y}{xy}}$$

(10)

-5/mistake

$$= \frac{y-x}{xy}$$

$$46. \frac{x + \frac{xy}{y-x}}{\frac{y^2}{x^2 - y^2} + 1}$$

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

$$= \frac{2yx - x^2 + 2y^2 - xy}{x} = \frac{yx - x^2 + 2y^2}{x}$$

HW 6

11/11/09
①

Section 9.7: 12, 14, 26, 42, 45, 52, 53

12. $y = -3/(x+2)$

a) Fully factored

b) y -intercept = $-3/(0+2) = -3/2$
 x -intercepts none

c) Sign Table

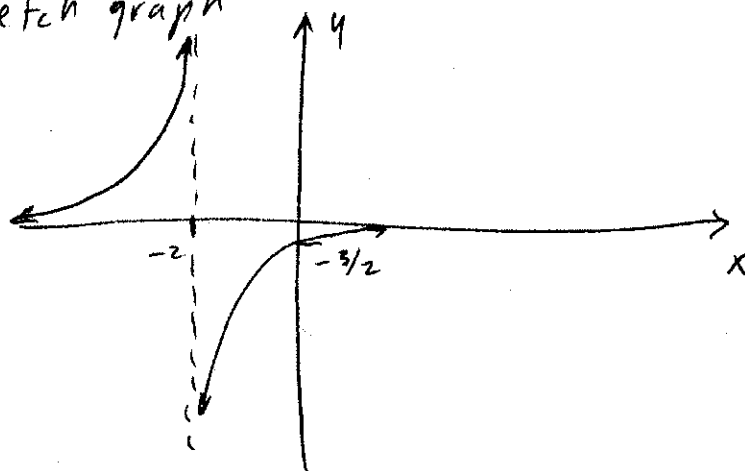
x -asymptote = -2 (vertical) horizontal asymptote $y=0$

d)

Factor		-2	
-3	$-$		$-$
$x+2$	$-$	∞	$+$
y	$+$	∞	$-$

e) $y \rightarrow 0$ when $x \rightarrow \pm \infty$

f) Sketch graph



[10]

19.

2

$$y = (x-1)/(x+1)$$

NP [1] a) Fully factored

NP [1] b) y-intercept $(-1)/(1) = -1$

NP [1] x-intercept = 1

NP [1] c) (horizontal asymptote $y = 1$) \rightarrow see question (e)
vertical asymptote $x = -1$

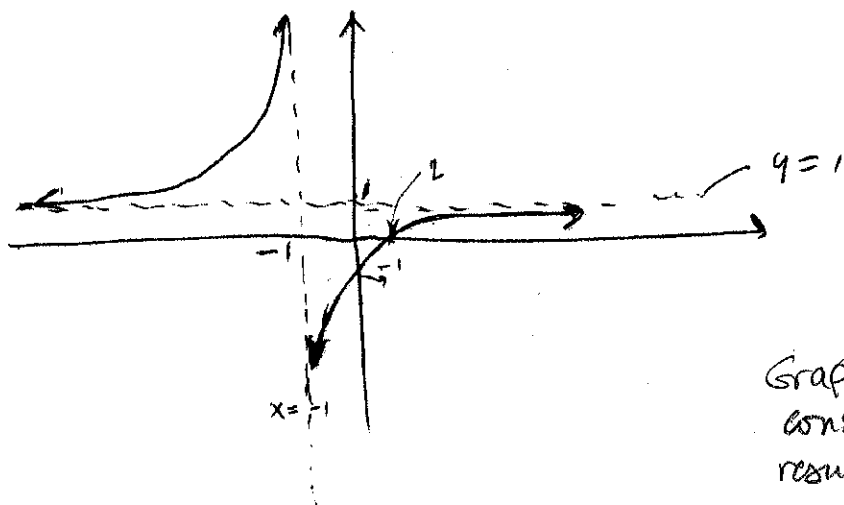
d) Sign Table

Factor	-1		1	
$x-1$	-		-	+
$x+1$	-	∞	+	+
y	+	∞	-	+

-1 / wrong line / column

NP [1] e) $y \rightarrow 1$ as $x \rightarrow \pm \infty$

[3] f) Sketch graph



Graph must be consistent with results.

-1 / inconsistency

26. $y = x / [(x+1)(x-3)]$

a) Fully Factored

b) y -intercept = 0

x -intercept = 0

c) horizontal asymptote $y = 0$

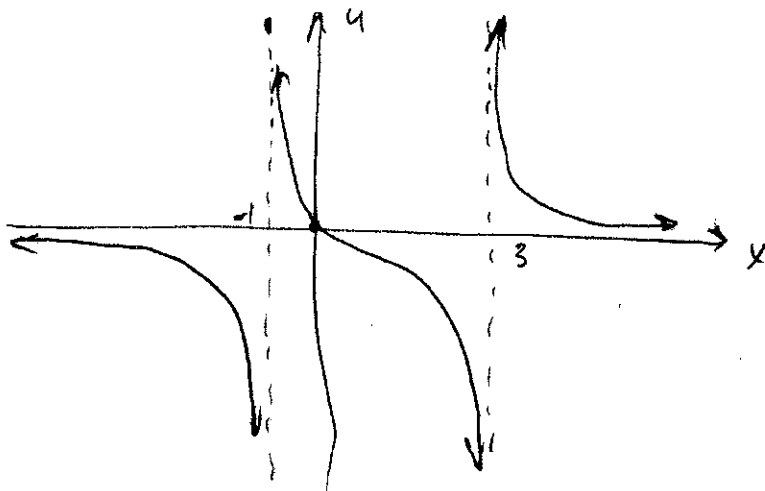
vertical asymptotes $x = -1, x = 3$

d) Sign Table

Factor		-1		0		3	
x	-		-	0	+		+
$x+1$	-	∞	+		+		+
$x-3$	-		-		-	∞	+
y	-	∞	+	0	-	∞	+

e) $y \rightarrow 0$ as $x \rightarrow \pm \infty$

f) Sketch graph



(30) a) $y = \frac{4x^2+1}{x^2-1}$
 $= \frac{4x^2+1}{(x+1)(x-1)}$

[2] a) not fully factored, $\frac{4x^2+1}{(x+1)(x-1)}$

[2] b) y-intercept, -1

[2] x-intercept, none

[2][2] c) vertical asymptotes: 1, -1

[4] d) Sign table

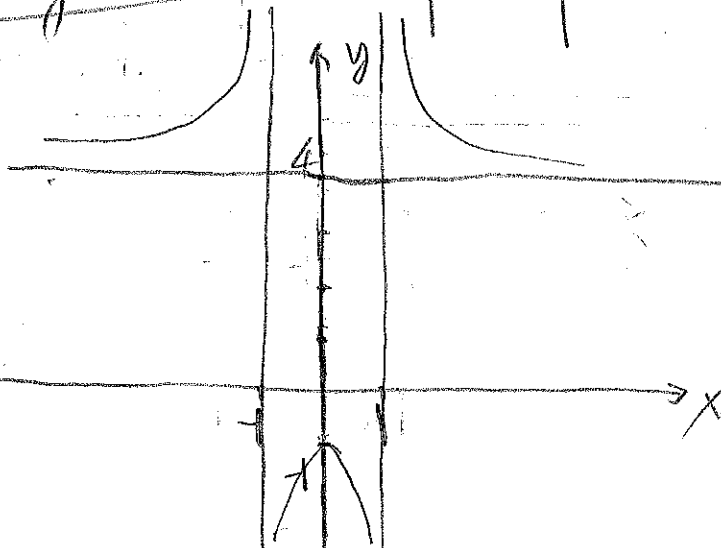
	-1		1	
$4x^2+1$	+		+	+
$x+1$	-	∞	+	+
$x-1$	-		-	∞
y	+	∞	-	+

+/wrong line

[2] e) As $x \rightarrow \pm\infty$, $f(x) \rightarrow 4$

[4] f)

-1/inconsistency with results above



$$b) \quad y = \frac{4x^2 + 1}{x^2 + 1}$$

a) Fully factored.

b) y intercept 1

x intercept None

c) x asymptote None

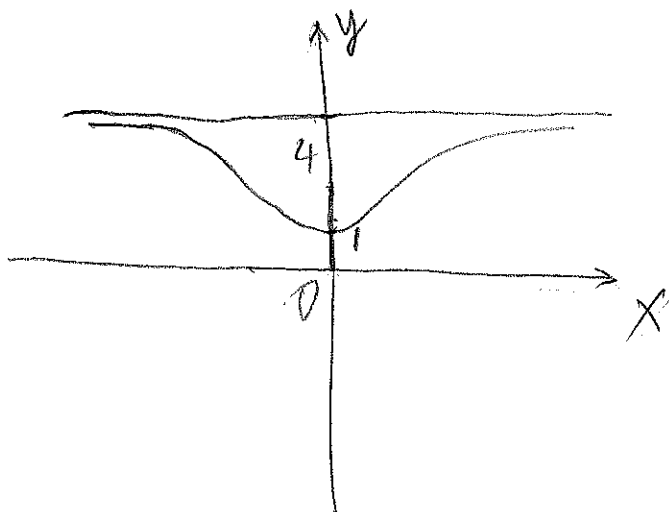
y asymptote 4

d) Sign table

$4x^2 + 1$	+
$x^2 + 1$	+
y	+

e) $x \rightarrow \pm\infty$ $y \rightarrow 4$

f)



$$32. y = (4x^2 - x - 3) / (2x^2 - 3x - 5)$$

a) not fully factored

$$(4x + 3)(x - 1) / (2x - 5)(x + 1)$$

b) y intercepts = $-\frac{3}{-5} = \frac{3}{5}$

x intercepts = $-\frac{3}{4}, 1$

c) y asymptote 2

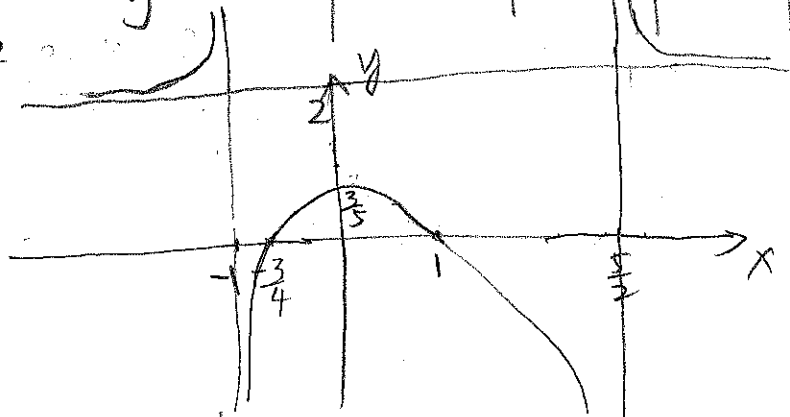
x asymptotes $\frac{5}{2}, -1$

d) Sign Table

	-1	$-\frac{3}{4}$	1	$\frac{5}{2}$	
$4x+3$	-	0	+	+	
$x-1$	-	-	0	+	
$2x-5$	-	-	-	0	
$x+1$	0	+	+	+	
y	+	0	-	0	+

e) as $x \rightarrow \pm\infty, y \rightarrow 2$

f)



[20]

42.

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

[2] a) Factor $\frac{(2x+1)(x-2)}{(x-4)(x+1)}$

[2] b) y-intercept = $\frac{(1)(-2)}{(-4)(1)} = \frac{1}{2}$

[1][1] x-intercepts $\{-\frac{1}{2}, 2\}$

[2][2] c) vertical asymptotes $x = -1, x = 4$

d) Sign Table

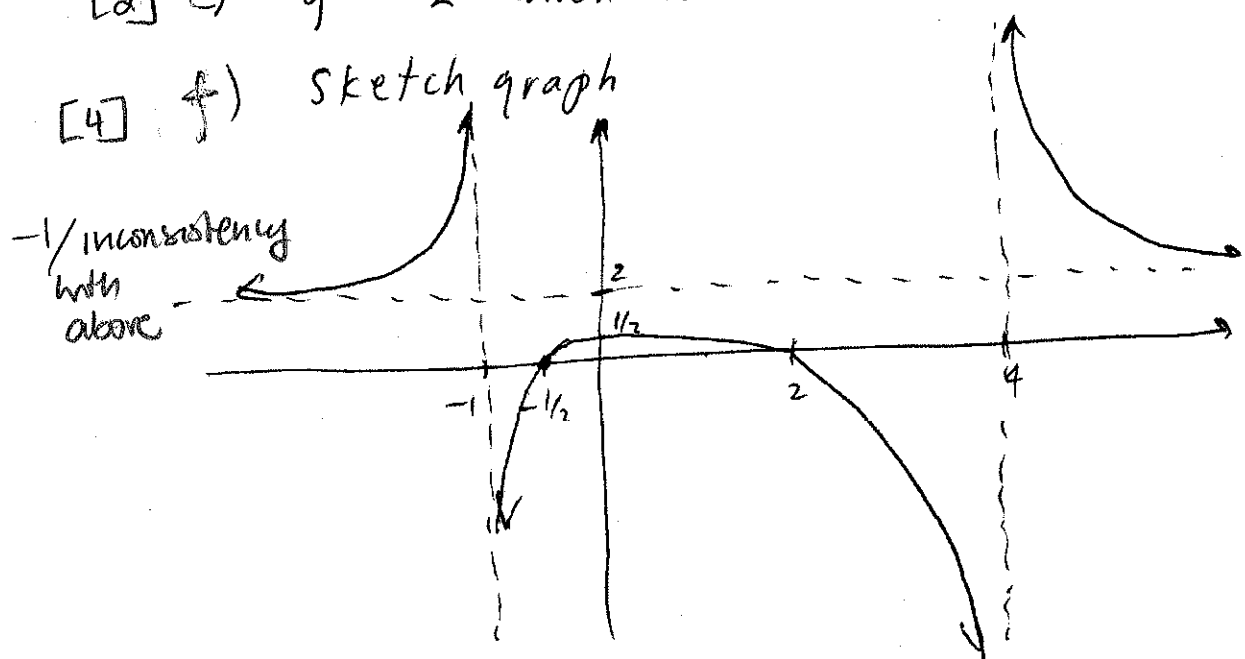
[4]

Factor	-1	$-\frac{1}{2}$	2	4
$2x+1$	-	- 0	+	+
$x-2$	-	-	- 0	+
$x-4$	-	-	-	- 0
$x+1$	- 0	+	+	+
y	+ 0	- 0	+ 0	- 0

-1/missing line

[2] e) $y \rightarrow 2$ when $x \rightarrow \pm \infty$

[4] f) sketch graph



44. 91 $y = \frac{x+2}{x+2}$

a) not fully factored

b) x-intercepts, none

y-intercepts, 1

c) for x, = (excluded point) -2

y-asymptote, None

d) Sign table

	-2	
x+2	-	+
x-2	-	+
y	+	+

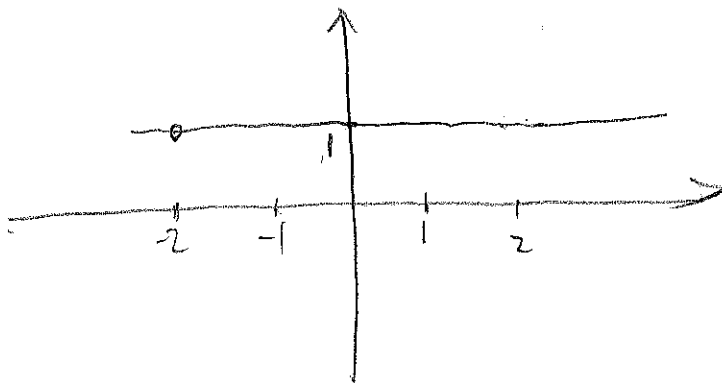
↑ exclusion

or

1	+
f(x)	+

e) as $x \rightarrow \infty$ $y \rightarrow 1$

f/



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

[10]

[1] a) not fully factored.

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

[1] b) x intercept -2

[1] y intercept 2

[1] c) exclusion at $x=2$

y asymptote none

[2] d) as $x \rightarrow +\infty$ $y \rightarrow +\infty$
as $x \rightarrow -\infty$ $y \rightarrow -\infty$

[2] e) sign table

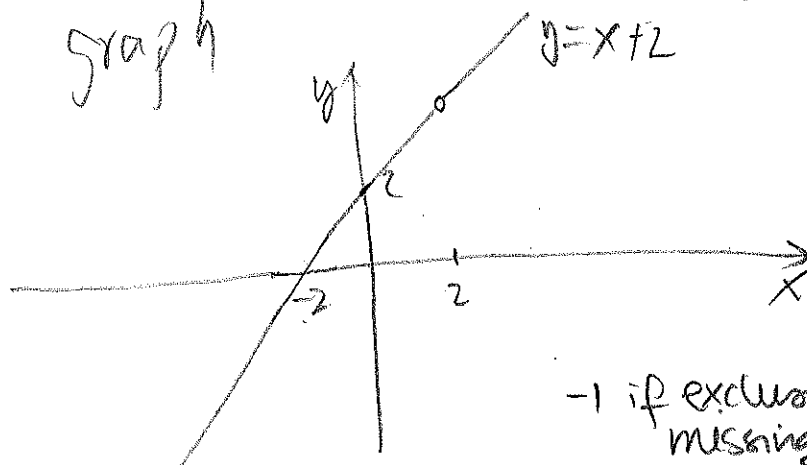
	-2	
$x+2$	- 0 +	
$f(x)$	- 0 +	

OR
(both ok)

	-2		2	
$x+2$	- 0 +		0 +	
$x-2$	-		0 -	
$x-2$	-		0 +	
y	-		+ -	

↑ exclusion

[2] f) graph



-1 if exclusion is missing

$$c) \quad y = \frac{(x-1)}{(x-1)(x-2)}$$

a) fully factored

b) x intercept = None

$$y \text{ intercept} = -\frac{1}{2}$$

c) x asymptote: $x=2$ excluded point, $x=1$

y asymptote: $y=0$.

d) as $x \rightarrow \infty$ $y \rightarrow 0$

as $x \rightarrow -\infty$ $y \rightarrow 0$

e) sign table

	$x=1$	$x=2$	
$x-1$	-0	+	+
$x-1$	$-\infty$	+	+
$x-2$	-	$-\infty$	+
y	-	$-\infty$	+

both
ok

or

	$x=2$	
$x-2$	$-\infty$	+
$f(x)$	$-\infty$	+

f) graph

